

INSTITUTIONAL LOCK-IN AND PRODUCER-CONTROLLED
CROP RESEARCH CHECK-OFFS IN SASKATCHEWAN

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In Partial Fulfillment of the Requirements for the
Degree of Master of Science in the Department of
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By

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ABSTRACT

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Supervisor: Dr. Richard Gray

Today, there are nine provincially legislated check-off programs in Saskatchewan. Check-off and research investment rates among these programs are typically low. Most check-off rates are below 0.5 per cent of the value of the underlying commodity and agency research expenditures as a percentage of the value of the underlying commodity are, in most cases, less than 0.1 per cent. Persistently low levels of investment combined with evidence from empirical studies suggest farmers chronically underinvest in crop research from a profit maximizing perspective.

The refundable nature of Saskatchewan crop research check-offs may be one reason why farmers' collective level of research investment has not increased in a material way. Of the nine provincially legislated crop check-off agencies, eight were established and continue to operate as Commissions which administer mandatory yet refundable check-offs. With refundable check-offs, producers may request and receive a full refund of their check-off contribution. It can be hypothesized that Commissions may set check-off rates below the optimal, farmer-profit-maximizing level to avoid excessive refund requests.

Anecdotal evidence from the Saskatchewan Pulse Development Board and Australia's Grains Research Development Corporation suggests that when check-offs are compulsory check-off rates are higher. Despite the apparent advantages of switching to compulsory levies, no Commission has attempted to switch.

The findings of this thesis suggest Crop Development Commissions in Saskatchewan suffer from institutional lock-in which inhibits their ability to switch to non-refundable check-

offs. Large set-up cost associated with establishing a Commission, coordination effects that occur both within a Commission and between Commissions, and the adaptive expectations of farmers and those directly involved with crop development check-offs have made the costs of switching from a Commission to a board prohibitively high. As a result, Commissions are entrenched and unable to adopt non-refundable check-offs.

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CHAPTER 1: INTRODUCTION

1.1 Introduction and Problem Statement

Widespread and persistent high rates of return to agricultural research suggest a pattern of chronic underinvestment. A large body of empirical evidence which includes numerous studies on many types of agricultural research, on many different crops, in many different jurisdictions, and over many different time periods reveals rates of return on research investments that far exceed typical market rates of return (Alston et al. 1998; Alston et al. 2000; Alston et al. 2010). For example, Alston et al. (1998) conducted a meta-analysis of 294 studies that examined the returns to agricultural research and found an average rate of return of 58.6 per cent per year. These results indicate that additional investment in agricultural research would benefit society. As benefits accrue, additional investment would drive the rate of return down toward market rates of return that reflect the social cost of capital.

The apparent lack of private investment in agricultural research can be attributed to incomplete property rights and an inability to capture full value from innovation (Alston and Pardey 1999). Often, new knowledge can be easily copied without full remuneration of those who created it. In crop breeding for example, farmers can often multiply and retain seed for years without payment to the crop breeder. Some agronomic knowledge can be copied by literally looking over the fence.

Traditionally, many governments addressed the lack of private incentives by investing directly in agricultural research (Malla 2000). In Canada, the 1885 Experimental Farm Act, which helped establish agricultural research stations across the country, recognized that public agricultural research was essential for agricultural development. Despite over a century of success, the level of public investment in production-related agricultural research has declined.

This trend will likely continue as demands for government funding in other areas of the economy increase and rural populations decrease.

In Canada, “check-offs” or “levies” have become a common source of crop research funding. The term check-off, “comes from the concept of checking off the appropriate box on a form, like a tax return, to authorize a contribution for a specific purpose” (Williams and Capps 2006, p. 53). In a typical check-off program, check-offs are deducted from producers’ receipts at the first point of sale, forwarded to the appropriate agency, and then allocated to various activities that benefit the agency’s members, such as research and development.

Over the past 28 years, nine producer-controlled crop check-off agencies have been established under provincial legislation in Saskatchewan. The Saskatchewan Pulse Development Board was established in 1984, followed by the Saskatchewan Canola Development Commission in 1990, the Saskatchewan Flax Development Commission in 1996, the Saskatchewan Alfalfa Seed Producers Development Commission in 1997, the Saskatchewan Mustard Development Commission in 2003, and the Saskatchewan Forage Seed Producers Development Commission in 2005. The Canaryseed Development Commission of Saskatchewan, Saskatchewan Oat Development Commission, and Saskatchewan Winter Cereal Development Commission were each established in 2006. In addition, the Western Grains Research Foundation, which operates under federal legislation, began collecting check-offs on wheat and barley produced in the prairie provinces in 1993. As a result of these initiatives, all of the major grain crops and many minor crops grown in Saskatchewan have producer-controlled research funding.

Despite the broad adoption of check-offs, producer agencies have failed to adequately address the problem of producer underinvestment. This is evident both in the high rate of return on investment and low absolute levels of investment. Studies such as Gray and Scott (2003),

Scott et al. (2005), and Gray et al. (2008) reported producer benefit-cost ratios ranging from 4.4:1 to 20.2:1 from check-off based investments in crop research. Benefit-cost ratios exceeding 1 suggest collective producer underinvestment from a profit-maximizing perspective since additional investment would generate greater benefits than what can be captured on investments elsewhere.

Check-off agencies' low research investment levels are also consistent with a pattern of underinvestment. According to the Canadian Seed Trade Association, check-off based plant research and development expenditure represented approximately four per cent of total plant research and development expenditure in Canada in 2007 (Canadian Seed Trade Association 2008). On the farm, check-off expenses pale in comparison to other farm input expenses. In 2005, the average Saskatchewan farm spent approximately \$30,000 on fertilizer and pesticide inputs (Statistics Canada 2006). Between 2000 and 2004, the average alfalfa seed, pulse, canola, and flax producer contributed roughly \$177, \$88, \$12, and \$11 per year to their respective check-off programs (Campbell et al. 2007).

Saskatchewan crop check-off rates typically range between 0.15 and 1.0 per cent of the value of the underlying commodity; however, most are set at less than 0.5 per cent. Since levies are agencies' primary source of revenue, low funding levels translate into low levels of research investment (see Table 1-1). For comparison, the average OECD research intensity for all industries in 2008 was 2.28 per cent according to the 2010 OECD Factbook.¹

¹ The average OECD research intensity for all industries in 2008 represents total domestic research and development expenditure as a percentage of total gross domestic product for the year.

Table 1-1: Selected Data for Crop Check-offs in Saskatchewan

Commodity	Check-off rate ^a <i>percentage</i>	R&D Intensity ^b <i>percentage</i>	Refundable Status	Check-off Revenue <i>3-year average</i>
Pulse	1.00	0.44	Non-refundable	9,474,821
Canola	0.21	0.07	Refundable	2,965,617
Flax	0.32	0.03	Refundable	568,853
Alfalfa Seed	0.78	0.37 ^c	Refundable	124,809
Mustard	0.50	0.06	Refundable	329,059
Forage Seed	0.75	0.09 ^c	Refundable	48,688
Canaryseed	0.41	0.12	Refundable	264,895
Oat	0.36	0.05	Refundable	673,099
Winter Cereals	0.32	0.01	Refundable	191,753
Wheat	0.15	0.08	Refundable	5,536,111 ^d
Barley	0.29	0.17	Refundable	906,195 ^d

^a Check-off as a percentage of the value of the underlying commodity.

^b R&D investment as a percentage of the value of the underlying commodity.

^c Figure calculated based on seed sales only. If the value of forage production were included, the intensity would be much lower.

^d Figure represents revenue collected on production in the Canadian Wheat Board's (CWB) catchment area, which includes Manitoba, Saskatchewan, Alberta, and part of British Columbia. Source: Author's calculations. See Appendix A.

The body of evidence indicating high rates of return combined with generally low levels of research expenditure begs the question, why do producer-controlled crop check-off agencies spend so little on research? There is likely no single answer to this question; however, there are a number of hypotheses, briefly described below and discussed in greater detail in Chapter 3, on why producer underinvestment persists.

First, information is an important factor in investment decisions (Stigler 1961). Crop research benefits are often attributed to factors such as changes in farming practices and weather patterns. In the absence of economic studies and extensive communications, producer organizations and the producers they represent may underestimate research benefits and thus be unwilling to support additional investment.

Second, agricultural co-operatives, like producer-controlled research check-off agencies, may suffer from the "horizon problem" (Cook 1995). The horizon problem occurs when

members' time horizons for residual claims on a productive asset are shorter than the productive life of the asset, creating a disincentive for members to invest in growth opportunities (Cook 1995). Crop research benefits are often realized decades after the initial costs are incurred and, according to Statistics Canada's 2006 Census of Agriculture, the median age of farm operators in Saskatchewan was 53 years. Given the lengthy time lag between research cost and benefits, producers nearing retirement may be unwilling to invest more in research.

Third, producers are heterogeneous in many respects such as farm size, commodities produced, and soil and climate conditions, which could affect their ability to benefit from crop research and their attitudes toward research funding.

Fourth, a fear that additional farmer investment would result in reduced public investment in research may contribute to low levels of investment. This attitude may stem from the fact that reductions in public support for plant breeding were catalysts for the establishment of some producer check-offs in the first place. Each of these factors may contribute to a lack of producer support for more check-off based investment in research.

A fifth issue that may reduce the level of research check-offs is known in economic literature as the "free-rider problem." As show in Table 1-1 above, eight of the nine check-off programs in Saskatchewan administer refundable check-offs. This means that producers who market these commodities can request and receive a full refund of their check-off contributions. While some would argue this makes agencies more accountable, it also allows any producer to "free-ride" on other producers' research contributions. Thus, farmers can forego the cost of the check-off yet still be entitled to the benefits of research. Development commissions may set low check-off rates to avoid excessive free-riding by farmers (Campbell et al. 2007).

In contrast to the development commissions, the Saskatchewan Pulse Development Board, which is funded by a non-refundable check-off, has seen significant growth in both funding levels and research expenditures. Between 2002 and 2004, the pulse check-off rate was doubled from 0.5 to 1 per cent of industry sales. The new rate is significantly higher than the rates set by commissions for other grain crops with refundable check-offs. The Saskatchewan Pulse Development Board also has the highest research intensity at 0.44 per cent and allocates more dollars to research than any commission. The only development agency that administers a non-refundable check-off has also been the most successful in funding research.

The experience in Australia is consistent with the idea that research agencies will choose higher levy rates when their levies are compulsory. The Australian Grain Research and Development Corporation administers compulsory crop levies on 25 different commodities. This producer/industry-controlled organization maintains a one per cent check-off rate on various crops that include cereals, canola, canaryseed and oats among others, which is significantly higher than their refundable Canadian counterparts.

A Saskatchewan development commission wishing to increase its levy rate may attempt to do so, as the Canola Commission did, by remaining as a commission. However, under this option, the commission would be faced with the risk of increased refund requests from farmers. To mitigate this risk, one would expect that the commission would first inform their farmer members, through websites, newsletters and meetings, etc., of the rationale for the rate increase. Presumably, the commission would argue the benefits to farmers from increased investments in research resulting from the increased levy would far outweigh their increased contributions. How effective this educational campaign would be is of course unknown because the incentive to request a refund would increase with the levy rate.

A second option would be to make the check-off non-refundable by converting from a commission to a board. This option may prove costly, since it would likely involve an extensive consultation process with producers, regulators, and politicians. However, because this option mitigates the free-rider problem, it has a potentially higher payoff than the first option.

It should be noted that while switching to a non-refundable check-off would reduce the potential for farmer free-riding, it may not fully eliminate it. Under a non-refundable check-off regime, free-riding could still occur as farmers who oppose the compulsory nature of the check-off may either implicitly or explicitly apply pressure for the check-off to be set at a sub-optimal level (Campbell et al. 2007). Whether or not an agency's ability to fund research is greater under a non-refundable check-off than it is under a refundable check-off is not necessarily clear; however, as discussed above, anecdotal evidence from the Saskatchewan Pulse Growers as well as the Australian experience suggest non-refundable check-off agencies are able to access more research funding from producers.

Interestingly, despite the apparent advantages of switching to a board, no crop development commission in Saskatchewan has done so and there is seemingly little interest in the idea.² There are a number of possible reasons why commissions have not switched to boards, which are discussed in greater detail in Chapter 3. One possible reason why switching has not occurred can be found in the literature on institutional change. North (1990) argues that institutions – the rules that govern human interaction – are self-reinforcing by nature, which makes them prone to a phenomenon called “institutional lock-in.” North's theory suggests that part of the reason commissions continue to administer refundable check-offs is because they, and others like them, have done so in the past. Do commissions suffer from institutional lock-in?

² Notably in 2009, a wheat check-off in Ontario converted from a refundable to a non-refundable while an Alberta beef industry check-off converted from a non-refundable to a refundable.

1.2 Purpose and Objectives

Given the economic benefits of additional check-off funding and the apparent ability of crop development boards to mitigate the free-rider problem and fund research at higher levels, the purpose of this thesis was to examine the factors that have prevented existing producer-controlled crop development commissions from transforming to boards. The specific objective of this thesis was to examine the hypothesis that commissions suffer from institutional lock-in that inhibits transformation from commission to boards. While not providing a definitive answer to the larger issue of producer underinvestment in agricultural research, this research can provide knowledge regarding why a potentially important institution that could be used to address the free-rider problem is not being pursued by the industry.

The empirical aspect of the study was confined to crop research check-offs in the province of Saskatchewan. The province, which has nearly 50 per cent of the cropland in Canada, has many crop research organizations that operate within the same legislative framework.

1.3 Methodology

Since the goal of this thesis was to explore the institutional structure of producer-controlled crop research check-offs in Saskatchewan, the first step was to document the history of farmer-funded crop research in the province and identify the key differences between commissions and boards with respect to their research funding levels and expenditure patterns. This involved an examination of the relevant legislation and the agencies' annual reports.

The second step was to develop a theoretical framework to examine and analyze the incentives and constraints for a commission to pursue board status. This involved a thorough review of the literature related to institutional change, and the development of several propositions that were tested empirically.

The third step was to conduct interviews with the leadership of check-off organizations to document the challenges, as perceived by check-off organizations, related to transforming from commission to board.

The final step was to conduct a qualitative analysis of the data – specifically, to test the propositions related to institutional change and improve our general understanding of whether development commissions are subject to institutional lock-in. Since check-offs have become important institutions for funding and directing certain types of agricultural research in Canada, the examination of institutional lock-in conducted in this study has important implications for agricultural policy. This analysis relates to the key issue of underinvestment in agricultural research.

1.4 Organization of the Study

This thesis contains six chapters. Chapter 2 provides an overview of check-off legislation in Saskatchewan and examines each check-off agency's financial performance. Chapter 3 includes a survey of the literature on the returns to agricultural research, discusses the economic rationale for the use of producer-controlled research check-offs as a means to fund and direct certain types of agricultural research, and examines the nature and potential causes of producer underinvestment in crop research. Chapter 4 presents a theoretical framework for examining institutional lock-in in the context of producer-controlled check-offs. The chapter reviews lock-in literature and presents four research propositions. Chapter 5 contains the analysis of the data collected to test each of the research propositions. A summary of the study's findings and policy implications, as well as a discussion regarding the limitations of the study and recommendations for further research, are contained in Chapter 6.

CHAPTER 2: BACKGROUND

2.1 Introduction

Crop research check-offs in Saskatchewan are administered by provincially legislated crop development agencies. Nine agencies have been established in Saskatchewan since the early 1980s. Of the nine, eight were established and continue to operate as commissions. Only one, the Saskatchewan Pulse Development Board, was established and continues to operate as a board. The Saskatchewan Pulse Development Board was the first agency to be established.

Chapter 2 examines the historical context and legal framework in which crop development agencies in Saskatchewan operate. It also examines the funding and expenditure patterns of each development agency.

2.2 Crop Research Check-offs in Saskatchewan

In Saskatchewan, producer-controlled crop research check-off programs are administered and operate under the provincial Agri-Food Act, 2004. The purpose of a development agency is to “promote and develop the production, marketing or, production and marketing of a defined agricultural product” (Government of Saskatchewan website a). Development agencies have the power to collect a “levy that will be used for research and development of the industry” (Government of Saskatchewan website a).

The Agri-Food Act, 2004, allows for the establishment of two types of development agencies – development commissions and development boards.³ The main difference between a commission and a board is the way in which they are funded. A development commission is funded by a mandatory, refundable check-off, while a development board is funded by a mandatory, non-refundable check-off. Both types of check-offs are considered “mandatory” since they are automatically deducted at the first point of sale. However, with refundable check-

³ Marketing boards can be established under the same Act for purposes of orderly marketing.

offs, farmers have the right to request and receive a refund of their check-off contribution whereas with non-refundable check-offs, as the term suggests, they do not.

Development agencies (both commissions and boards) operate within their own set of regulations and orders. Agency regulations “provide the structure and basis by which the agencies must operate” and define such things as the purpose of the plan, the powers of the agency, the fiscal year, the rules regarding producer registration, and the rules regarding levy refunds (Government of Saskatchewan website a). Agency orders are more specific as they stipulate the levy rate, requirements for refunds requests, and buyer registration among other things.

The Agri-Food Council (Council) is the regulatory body responsible for administering the Agri-Food Act, 2004. The Council consists of a board of directors who are appointed by the provincial government. The Council provides advice to the Agriculture Minister; helps groups establish levies; monitors the agencies’ finances; supervises votes on establishing agencies; and ensures accountability, compliance, and dispute resolution (Government of Saskatchewan website a).

Nine crop development agencies have been established under provincial legislation in Saskatchewan since 1984. They are, in chronological order, the Saskatchewan Pulse Development Board, the Saskatchewan Canola Development Commission, the Saskatchewan Flax Development Commission, the Saskatchewan Alfalfa Seed Producers Development Commission, the Saskatchewan Mustard Development Commission, the Forage Seed Development Commission, the Canaryseed Development Commission of Saskatchewan, the Saskatchewan Oat Development Commission, and the Saskatchewan Winter Cereal Development Commission.

2.2.1 Saskatchewan Pulse Development Board

The Saskatchewan Pulse Development Board (SPDB) was established on July 13, 1984. It is funded by a mandatory non-refundable check-off on the sale of pulses. Originally, the pulse check-off was set at 0.5 per cent of the gross value of the sale; however, between 2002 and 2004, the rate was increased to 1 per cent. There are approximately 18,000 producers registered with the SPDB. The agency's mission is, "To provide leadership for an innovative, profitable and sustainable Saskatchewan pulse industry through research, market development and communication in collaboration with stakeholders" (Saskatchewan Pulse Growers website). The SPDB's vision statement is, "Saskatchewan will be an industry leader in the production, processing, and marketing of high quality and high value pulse products for a viable and profitable Canadian pulse industry" (Saskatchewan Pulse Growers website).

The SPDB's average annual check-off and total revenues from fiscal 2007 to fiscal 2009 were \$9.475 million and \$10.29 million respectively. Research expenditure over the period averaged \$4.19 million per year, 41 per cent of average total revenue. Administration, Pulse Canada, communication, variety commercialization, policy, and domestic market development expenditures combined represented 27 per cent of average total revenue.⁴ Excess revenue over expenses represented the remaining 32 per cent of average total revenue over the period.

⁴ Pulse Canada is a national pulse industry association that represents the interests of pulse producers, processors, and traders. Market access, market growth and innovation, transportation, environment, and industry initiatives are among the issues Pulse Canada focuses on (Pulse Canada website).

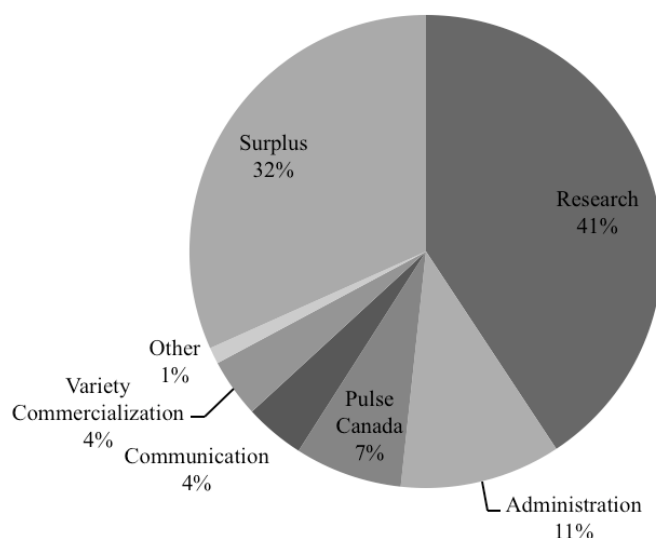


Figure 2-1. Shares of SPDB's Total Revenue from September 1, 2006 to August 31, 2009

Source: Author's calculations based on SPDB annual reports

2.2.2 Saskatchewan Canola Development Commission

The Saskatchewan Canola Development Commission (SCDC) was established on February 6, 1991. It is funded by a mandatory refundable check-off on canola sales. Initially, the canola check-off was set at \$0.50 per tonne but was increased to \$0.75 per tonne between 2004 and 2005. The SCDC has a membership of approximately 26,000 producers. The agency's mission is, "To enhance canola producers' competitiveness and profitability through a producer led and controlled fund to support research, market development and extension activities" (SaskCanola website). Their vision statement is, "Shaping canola's future for producer profitability" (SaskCanola website).

The SCDC's average annual check-off and total revenues from fiscal 2007 to 2009 were \$3.196 million and \$3.562 million respectively. Research expenditures over the period averaged \$941 thousand per year, 26 per cent of average total revenue. Market development, administration, communication and other expenditures combined represented 63 per cent of

average total revenue. Approximately 6 per cent of average total revenue was refunded back to producers and excess revenue over expenses represented 5 per cent for the period.

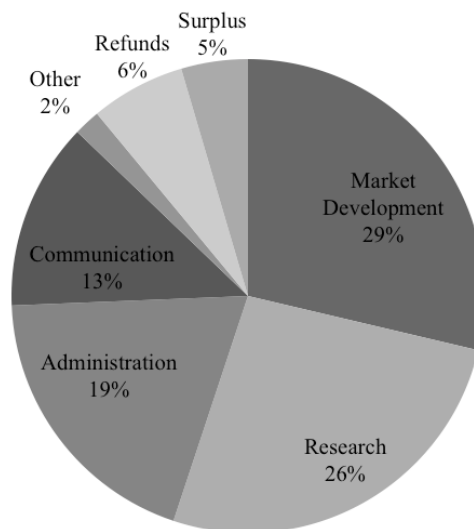


Figure 2-2. Shares of SCDC's Total Revenue from August 1, 2006 to July 31, 2007

Source: Author's calculations based on SCDC annual reports

2.2.3 Saskatchewan Flax Development Commission

The Saskatchewan Flax Development Commission (SFDC) was established on April 16, 1996. The agency is funded by a mandatory refundable check-off equal to \$1.18 per tonne on the sale of grain flax. Flax straw sales are subject to a \$0.50 per tonne check-off; however, the SFDC has not received any flax straw check-off revenue to date (Ulrich 2010). The SFDC has approximately 15,000 farmer members. The agency's mission is, "To lead, promote and enhance the production, value-added processing and utilization of Saskatchewan flax" (SaskFlax website).

The SFDC's average annual check-off and total revenues from fiscal 2007 to 2009 were \$596 thousand and \$786 thousand respectively. Average annual research expenditures were \$57 thousand, 7 per cent of average total revenue for the period. Market facilitation, administration

and communication together represented 76 per cent of average total revenue over the period. Refunds totaled 4 per cent while excess revenue over expenditures totaled 13 per cent of average total revenue for the period.

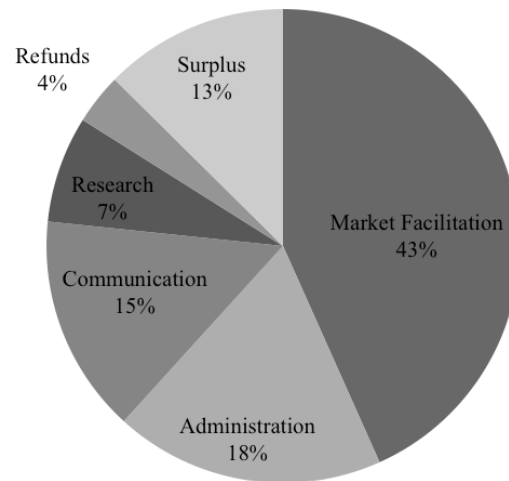


Figure 2-3. Shares of SFDC's Total Revenue from August 1, 2006 to July 31, 2009

Source: Author's calculations based on SFDC annual reports

2.2.4 Saskatchewan Alfalfa Seed Producers Development Commission

The Saskatchewan Alfalfa Seed Producers Development Commission (SASPDC) was established on July 24, 1997, and, since August 1 of that year, has collected \$0.0075 per pound of alfalfa seed sales.⁵ Today there are approximately 300 producers registered with the Alfalfa Seed Commission.

The SASPDC's average annual check-off and total revenues from fiscal 2007 to 2009 were \$135 thousand and \$165 thousand respectively. The SASPDC's annual research expenditures averaged approximately \$58 thousand, 35 per cent of average total revenue for the

⁵ Unlike most of the other check-off programs, the alfalfa seed check-off is collected on seed sales only. However, sales of alfalfa "breeder" seed are excluded.

three fiscal years ending in 2009. Administration, communication, and other expenditures together represented 39 per cent of average total revenue for the period. Refunds represented 7 per cent and excess revenue over expenses represented 19 per cent of average total revenue for the period.

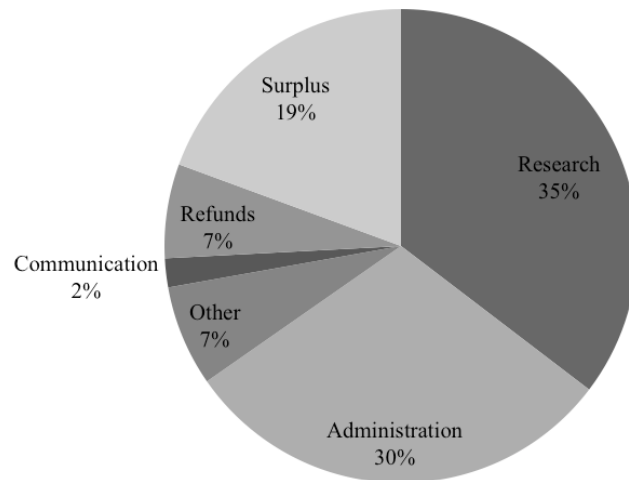


Figure 2-4. Shares of SASPDC's Total Revenue from August 1, 2006 to July 31, 2009

Source: Author's calculations based on SASPDC annual reports

2.2.5 Saskatchewan Mustard Development Commission

The Saskatchewan Mustard Development Commission (SMDC) was established in October 2003. Since January 1, 2004, the SMDC has collected a refundable check-off set at 0.5 per cent of the value of the sale of mustard. There are approximately 2,300 producers registered with the SMDC. The agency's mission statement is, "Growing the mustard industry for the benefit of growers through research, communication and market development programs" and their vision statement is, "Investing in the future for mustard grower profitability."

(Saskatchewan Mustard Development Commission website)

The SMDC's average annual check-off and total revenues from fiscal 2007 to 2009 were \$348 thousand and \$887 thousand respectively.⁶ The SMDC's annual research expenditures averaged roughly \$42 thousand, 5 per cent of average total revenue for the period. Expenditure on the Mustard 21 project represented roughly 52 per cent of the SMDC's average total revenue for the period. Administration, communication, and other expenses together represented 20 per cent of average total revenue. Refunds represented 2 per cent of average total revenue while excess revenue over expenses represented 21 per cent.

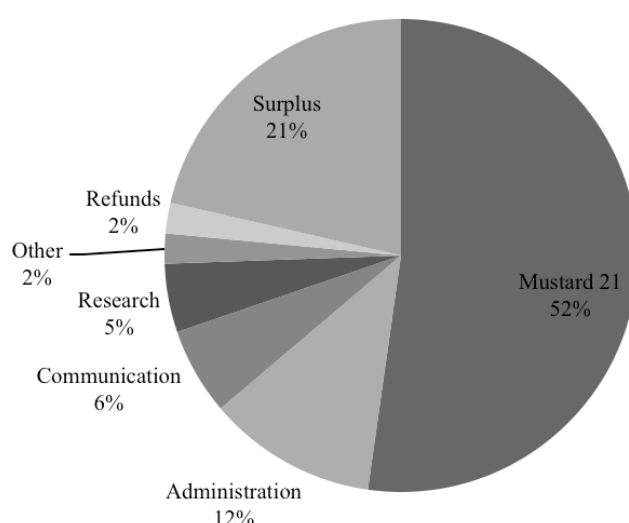


Figure 2-5. Shares of SMDC's Total Revenue from August 1, 2006 to July 31, 2009

Source: Author's calculations based on SMDC annual reports

2.2.6 Saskatchewan Forage Seed Development Commission

The Saskatchewan Forage Seed Development Commission (SFSDC) was established on June 29, 2005. The agency collects a mandatory refundable check-off set at 0.75 per cent of the gross value of the sale of forage seed (excluding alfalfa seed).⁷ Information on the size of the

⁶ Most of the revenue over and above the check-off revenue came from Agriculture and Agri-Food Canada.

⁷ Like with the alfalfa seed check-off, "breeder" forage seed sales are exempt from the program.

SFSDC's membership was not available; however, the number of producers registered with the Commission is expected to be in the low hundreds – similar to that of the SASPDC.

The SFSDC's annual check-off and total revenues from fiscal 2007 to 2009 both averaged \$51 thousand. Annual research expenditure averaged \$6 thousand over the period, 11 per cent of total revenue. Administration and communication expenses combined represented 16 per cent of total revenue. Refunds totaled 6 per cent and excess revenue over expenses totaled 68 per cent of total revenue over the three years of operation.

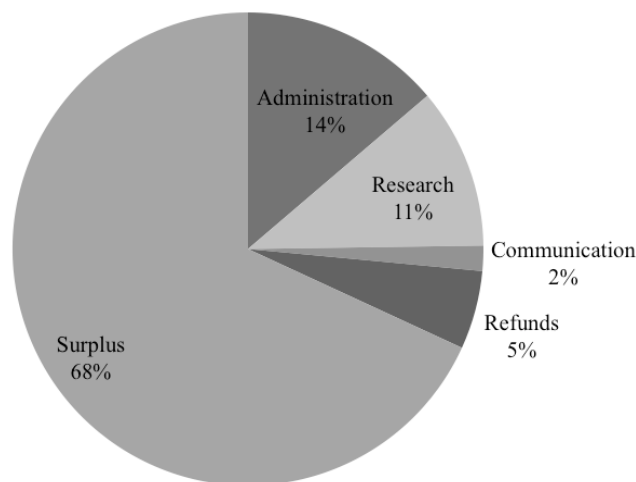


Figure 2-6. Shares of SFSDC's Total Revenue from June 30, 2006 to July 1, 2009

Source: Author's calculations based on SFSDC Annual Reports

2.2.7 Canaryseed Development Commission of Saskatchewan

The Canaryseed Development Commission of Saskatchewan (CDCS) was established on February 23, 2006, and began collecting levies on May 1 of that year. Since then, the CDCS has collected a mandatory refundable check-off set at \$1.75 per tonne on canaryseed sales. Today, there are approximately 5,000 producers registered with the Canaryseed Commission.

The CDCS's average annual check-off and total revenues from fiscal 2007 to 2009 were \$278 thousand and \$370 thousand respectively.⁸ Average annual research expenditure for the period was \$76 thousand, 20 per cent of average total revenue. Expenditures on an Advancing Canadian Agriculture and Agri-Food (ACAAF) project represented 18 per cent of average total revenue. Administration and communication expenses together represented 18 per cent of average total revenue while refunds and excess revenue over expenses represented 4 per cent and 40 per cent of average total revenue respectively over the three fiscal years of operation.

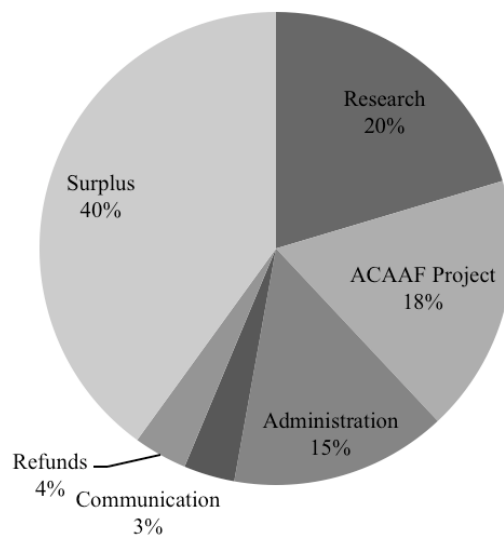


Figure 2-7. Shares of CDCS's Total Revenue from August 1, 2006 to July 31, 2009

Source: Author's calculations based on CDCS Annual Reports

2.2.8 Saskatchewan Oat Development Commission

The Saskatchewan Oat Development Commission (SODC) was established on April 12, 2006. Since then, the SODC has collected a mandatory refundable check-off set at \$0.50 per

⁸ Most of the revenue over and above the check-off revenue came from an Advancing Canadian Agriculture and Agri-Food project.

tonne on oat sales. There are approximately 9,000 producers registered with the Oat Commission.

The SODC's average annual check-off and total revenues from fiscal 2007 to 2009 were \$705 thousand and \$740 thousand respectively. The SODC's average research expenditure for the period was \$86 thousand, 12 per cent of the SODC's average total revenue. Administration, communication, and policy development expenditures together represented 14 per cent of average total revenue for the period. Refunds and excess revenue over expenses represented 4 per cent and 70 per cent of average total revenue respectively for the three fiscal years.

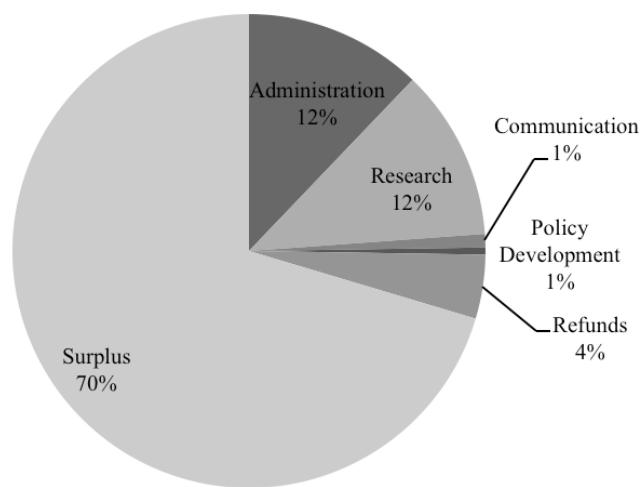


Figure 2-8. Shares of SODC's Total Revenue from August 1, 2006 to July 31, 2009

Source: Author's calculations based on SMDC Annual Reports

2.2.9 Saskatchewan Winter Cereals Development Commission

The SWCDC was established on August 16, 2006. Since then, the SWDC has collected a mandatory refundable check-off of \$0.50 per tonne on winter wheat, fall rye, and winter triticale sales. Today, there are approximately 2,800 producers registered with the agency.

The SWCDC's average annual check-off and total revenues from fiscal 2007 to 2009 were \$153 thousand and \$155 thousand respectively. Research expenditures averaged \$7 thousand per year for the period, 5 per cent of average total revenue.⁹ Administration, communication, and other expenses together represented 26 per cent of average total revenue for the period. Refunds and excess revenue over expenses represented 1 per cent and 68 per cent of average total revenue over the period respectively.

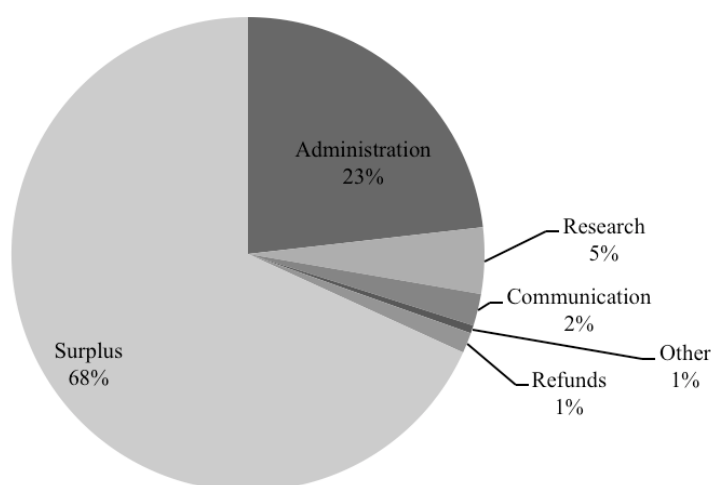


Figure 2-9. Shares of SWCDC's Total Revenue from August 1, 2007 to July 31, 2009
Source: Author's calculations based on SMDC Annual Reports

2.2.10 Summary

Of the nine crop development agencies operating in Saskatchewan, only the SPDB is funded by a non-refundable crop research check-off. The rest are development commissions that charge refundable check-offs. Agency membership ranges from the low hundreds, as is the case with the SFSDC and the SASPDC, to 26,000, as is the case with SCDC. Check-off revenue and

⁹ The SWCDC reported a \$21 thousand research expense in fiscal 2009. Prior to fiscal 2009 the agency had not reported any research expenditure.

research expenditure range from the tens of thousands as is the case for the forage seed and alfalfa seed check-off programs to multi-millions as is the case for the pulse and canola check-off programs.

Table 2-1. Saskatchewan Crop Development Agencies

Agency	Year Established	Registered Producers	Check-off Status	Check-off Rate	Check-off Revenue 000's	Research Expenditure 000's
SPDB	1984	18,000	Non-refundable	1% GVS ^b	9,475	4,190
SCDC	1991	26,000	Refundable	\$0.75/tonne	3,196	941
SFDC	1996	15,000	Refundable	\$1.18/tonne ^c	596	57
SASPDC	1997	300	Refundable	\$0.0075/pound	135	58
SMDC	2003	2,300	Refundable	0.5% GVS ^b	348	42
SFSDC	2005	NA ^a	Refundable	0.75% GVS ^b	51	6
CDCS	2006	5,000	Refundable	\$1.75/tonne	278	76
SODC	2006	9,000	Refundable	\$0.50/tonne	705	86
SWCDC	2006	2,800	Refundable	\$0.50/tonne	153	7

^a Data not available

^b Gross Value of the Sale

^c SFDC's \$1.18 per tonne check-off applies only to the sale of grain flax. Flax straw sales are subject to a \$0.50 per tonne check-off; however, the SFDC has not received any flax straw check-off revenue to date (Ulrich 2010).

Source: Agencies' Annual Reports. See Appendix A.

Total refunds as a percentage of total check-off revenue typically range from 5 to 7 per cent. For some commissions, such as the Flax and Canaryseed Commissions, refund rates have remained relatively stable. For others, the refund rates have increased over time. For example, refund rates for the Canola Commission were relatively low and stable from 2000 to 2003; but from 2003 to 2008 the refund rate increased each year. Since 2007, the refund rates for canola have exceeded 7 per cent. The increase in the canola check-off from \$0.50 per tonne to \$0.75 per tonne between 2004 and 2005 may have contributed to the increase in refunds.

Table 2-2. Refund Rates^a

Commodity	Fiscal Year Ending									
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Canola	3.1	4.5	4.3	4.7	5.8	6.2	6.6	7.1	7.4	7.2
Flax	4.8	4.4	5.3	4.6	5.5	6.3	4.3	4.1	5.7	4.0
Alfalfa Seed	9.4	5.7	5.9	9.5	5.1	7.4	7.7	7.8	13.4	2.1
Mustard					2.3	3.0	2.2	4.8	5.9	5.1
Forage Seed							4.9	10.7	2.2	2.2
Canaryseed							4.9	4.7	4.8	5.3
Oat								3.7	3.9	6.1
Winter Cereals								0.3	2.2	1.1

^a Dollars refunded as a percentage of gross check-off revenue.

Source: Author's calculations based on Development Agencies' Annual Reports. See Appendix A.

CHAPTER 3: LITERATURE REVIEW

3.1 Introduction

Studies that examine the economic impact of agricultural research suggest chronic underinvestment from society's perspective. The underinvestment problem is caused in part by the public-good nature of agricultural research. One way governments attempt to induce investment in agricultural research is by enacting regulations that facilitate collective action by producers: legislation that enables producer-controlled check-off programs is one example. Despite the broad adoption of check-offs, producer underinvestment still seems to be an issue. The low levels of investment among Saskatchewan check-off programs shown in Chapters 1 and 2, combined with evidence from empirical studies discussed below, support this argument. As mentioned in Chapter 1, there are many possible reasons why producers spend too little on research from a profit-maximizing perspective. One potentially important contributing factor is the refundable nature of check-off programs.

Chapter 3 is divided into three sections. The first section, "Underinvestment in Agricultural Research," summarizes the literature on the returns to agricultural research and discusses the theoretical arguments regarding why underinvestment exists. The second section, "The Economics of Research Check-offs," reviews theoretical literature that examines equity, incentives, efficiency, and some institutional advantages of research check-offs. The third section, "Putting the Research Question into Context," discusses some of the possible reasons why low funding levels persist among many crop development agencies and why commissions have failed to pursue board status.

3.2 Underinvestment in Agricultural Research

3.2.1 Evidence of Underinvestment

An overwhelming number of studies have examined the economic impacts of agricultural research. These studies often show social rates of return in excess of 20 per cent per year (see Table 3-1). Persistent high rates of return over and above the standard rate of return suggest underinvestment (Alston and Pardey 1999).¹⁰

Table 3-1. Selected Returns to Agricultural Research Studies

Study	Commodity	Country	Internal Rate of Return <i>percentage</i>
Griliches (1958)	Corn	USA	35 - 40
Peterson (1967)	Poultry	USA	20 - 30
Schmitz and Seckler (1970)	Tomato	USA	≥ 50
Akino and Hayami (1975)	Rice	Japan	73 - 75
Nagy and Furtan (1978)	Rapeseed	Canada	101
Scobie and Posada (1978)	Rice	Columbia	79 - 96
Zentner (1982)	Wheat	Canada	34 - 59
Ulrich et al. (1984)	Canola	Canada	51
Zentner and Peterson (1984)	Wheat	Canada	30 - 39
Ulrich and Furtan (1985)	Canola	Canada	50
Widmer et al. (1988)	Beef Cattle	Canada	63
Morris et al. (1994)	Wheat	Nepal	49 - 84
Klein et al. (1996)	Wheat	Canada	27 - 39
Gray and Malla (2000)	Wheat	Canada	40

Source: As noted in table.

One of the most influential studies on the return to agricultural research is Alston et al. (1998). The authors conducted a meta-analysis of 294 studies containing 1,858 estimates of the returns on agricultural R&D. The study found,

In the 95 percent dataset, the overall average rate of return across all 1,144 observations was 58.6 percent per annum, with a standard deviation of 51.7 (the estimated annual rates of return averaged 64.2 percent for research only, 46.3 percent for research and extension combined, and 75.6 percent for extension only). In the second dataset the overall average rate of return across all 1,181

¹⁰ According to Alston and Pardey (1999) the real rate at which governments borrow money – usually 3 to 5 per cent per year – is the appropriate comparison for rates of return to agricultural research.

observations was 63.4 percent per annum with a standard deviation of 66.7 (the rate of return averaged 70.5 percent for research only, 49.7 percent for research and extension, and 75.6 percent for extension only). (Alston et al. 1998, p. 27)

Studies that examine producer returns from crop research also show high rates of return. For example, Gray and Scott (2003) examined the economic impacts of the Saskatchewan Pulse Development Board's research expenditures for two periods. For the period 1984 to 2008, the study estimated a benefit-cost ratio of 6.1:1 – meaning pulse producers earned over six dollars for every dollar invested in pulse research through the Saskatchewan Pulse Development Board. For the period 1984 to 2020, the study estimated producers benefited by a factor of 15.6. Scott et al. (2005) estimated the economic returns to producers from the Western Grains Research Foundation's expenditures on wheat and barley research for the period 1998-2020. The study found that wheat and barley producers benefit by factors of 4.4 and 12.4 respectively. Gray et al. (2008) revisited the returns to pulse producers' research question and estimated a benefit-cost ratio of 15.8:1 for the period 1984 to 2012, and 20.2:1 for the period 1984 to 2024 (see Table 3-2).

Table 3-2: Returns to Producer Investment in Crop Research

Study	Commodity	Period	Benefit-Cost Ratio
Gray and Scott (2003)	Pulse	1984-2008	6.1 : 1
		1984-2020	15.6 : 1
Scott et al. (2005)	Wheat	1998-2020	4.4 : 1
	Barley	1998-2020	12.4 : 1
Gray et al. (2008)	Pulse	1984-2012	15.8 : 1
		1984-2024	20.2 : 1

Source: As noted in table

The results from these studies suggest producers collectively spend too little on research from a profit-maximizing perspective. Benefit-cost ratios exceeding 1 suggest collective producer underinvestment from a profit-maximizing perspective since additional investment would generate greater benefits than what can be captured on investments elsewhere.

3.2.2 Public Good Problem in Agricultural Research

New knowledge created by agricultural research often exhibits public good characteristics. Public goods are non-excludable – meaning individuals cannot be excluded from consuming the good – and non-rival – meaning consumption of the good by one does not diminishes its availability to another (Fulton et al. 2007). Plant breeding research exhibits public good characteristics when farmers can sow saved seed without paying the developer of the seed. Some types of agronomic research exhibit public good characteristics since farmers can freely acquire knowledge by copying their neighbours' practices. Once acquired, public good knowledge can be used over and over again at zero marginal cost.

Private firms lack the economic incentive to invest in public good research at the socially optimal level. Figure 3-3 illustrates what happens when production of a public good is left to private firms.

In Figure 3-3, MB_S is society's marginal benefit curve, which represents society's willingness to pay for the good (demand). MB_P represents the private demand for the good, which, in this case, is lower than MB_S since individuals can enjoy the benefits without having to pay for the research. MC is the private firm's supply curve.

Economic theory states that profit-maximizing firms will produce up to the point where the private marginal benefits equal the private marginal costs. This results in an equilibrium quantity of Q_P . However, the socially optimal level of output is Q_S . The resulting gap between Q_P and Q_S reflects the private firm's inability to fully appropriate the benefits of their research investments. A strengthening of property rights would shift the MB_P curve toward the MB_S curve, which would increase the quantity of privately supplied research.

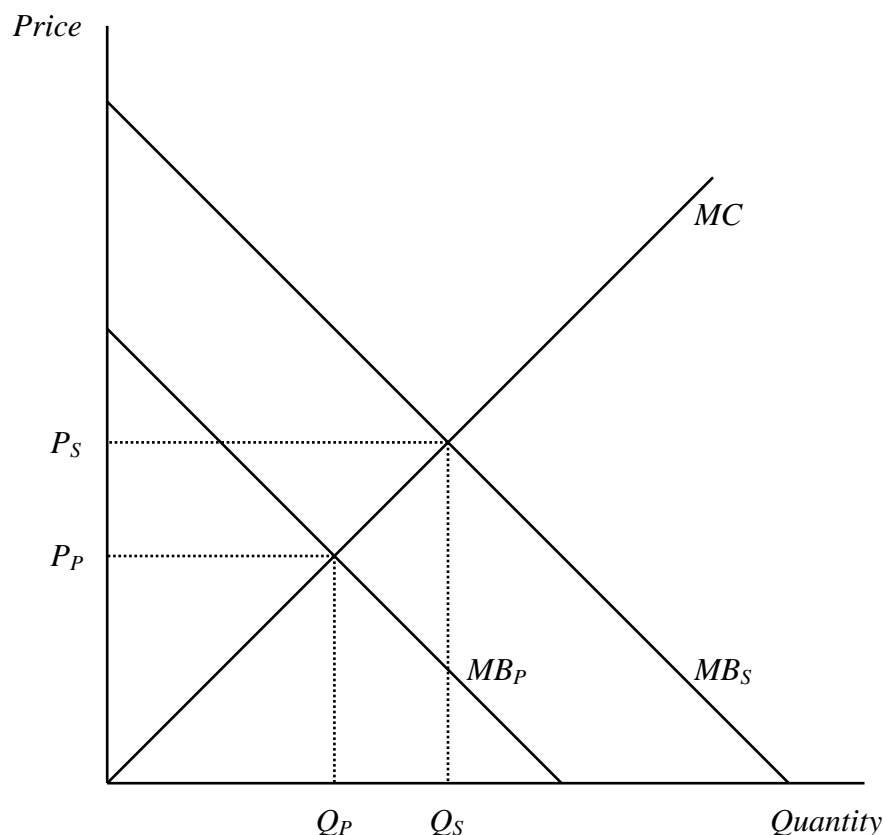


Figure 3-1. Private Expenditure on Public Good Research

Source: Gray et al. (2001)

Alston and Pardey (1999) attribute the market failure in agricultural R&D to the divergence between private and social costs and benefits. The non-excludable nature of many types of agricultural research is the primary reason why private and social interests are not aligned, and why agricultural research suffers from underinvestment from society's perspective.

3.3 The Economics of Research Check-offs

Governments may address a lack of private investment in agricultural research by conducting public good research themselves or by developing policy that encourages additional private investment. Additional private investment can be stimulated by strengthening property rights over agricultural innovation, subsidizing research, and creating institutional arrangements

that facilitate collective action by producers such as commodity check-off programs (Alston and Pardey 1999). Commodity check-offs in particular have a number of features that make them an attractive way to finance and govern the provision of certain types of agricultural research from society's perspective.

First, check-offs are a relatively "fair" way to fund research. Check-offs, in theory, allow for a proportional distribution of research costs and benefits between producers and consumers (Alston et al. 2004). For example, in Figure 3-2, a check-off of t per unit shifts the supply curve upward from S_0 to S_1 . In this case, consumer surplus decreases by P_1abP_0 and producer surplus decreases by P_0bcd , thus, both consumers and producers bear the check-off burden. In this particular example, consumers bear two-thirds and producers bear one-third of the check-off burden.¹¹

Now suppose the check-off revenue, represented by area P_1acd , is used to develop a new technology that reduces farmers' cost of production by k per unit. This reduction in producers' production cost is represented by the shift from S_1 to S_2 . Once again both consumers and producers benefit from the new technology as consumer surplus increases by area P_1aeP_2 , and producer surplus increases by area P_2efg . In this particular case, consumers capture two-thirds of the total research benefit while producers receive one-third. Thus, the distribution of the research benefits is proportional to the distribution of the research burden between producers and consumers.

¹¹ It should be noted that the check-off burden split between producers and consumers depends on the relative demand and supply elasticities.

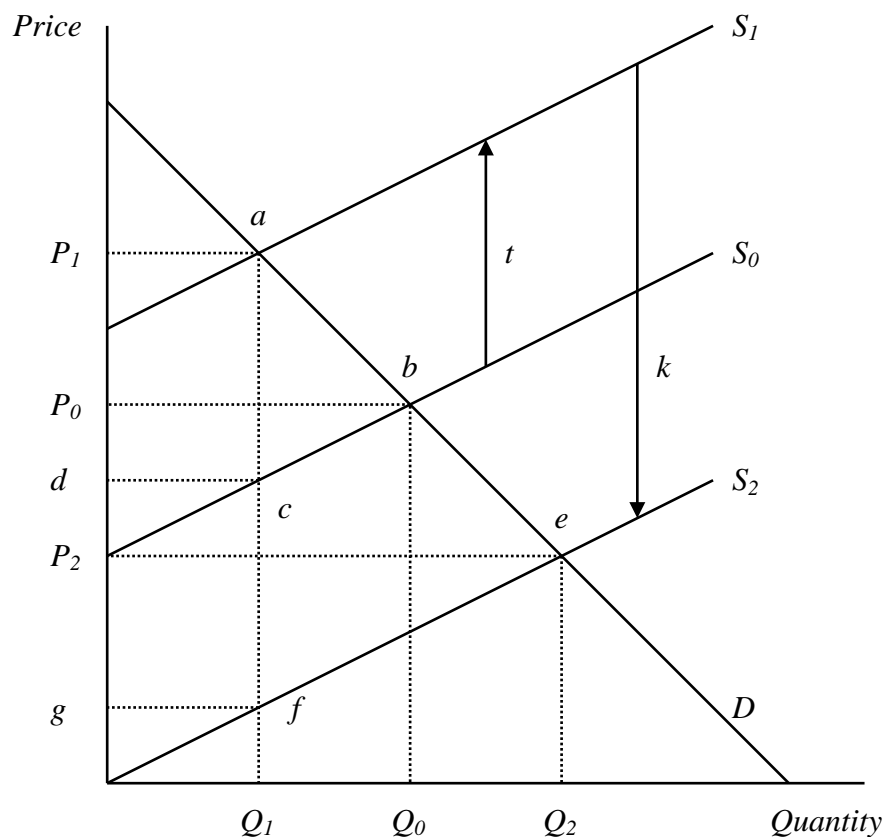


Figure 3-2. The Distribution of Check-off Burden and Research Benefits

Source: Adapted from Alston et al. (2004)

It is important to note that this theoretical equality of incidence holds even when the relative slopes of the demand and the supply curves are changed (Alston et al. 2004). For example, if the demand curve is completely horizontal (i.e., demand is perfectly elastic), and the supply curve is not, then producers bear 100 per cent of the research burden and receive 100 per cent of the research benefits. Conversely, if the demand curve is completely vertical (i.e., perfectly inelastic demand), and the supply curve is not, then consumers bear 100 per cent of the research burden and receive 100 per cent of the research benefits. Check-offs allow for a proportional distribution of research cost and benefit between producers and consumers

regardless of relative demand and supply elasticities. For this reason check-offs are considered to be a relatively fair way to fund research.

A second feature that makes check-offs an attractive tool for funding certain types of research relates to the fact that producer-controlled check-offs programs give farmers a voice in the direction of agricultural research. According to Picciotto (1995), the nature of a good determines which sector (private, public, or civil) is able to produce the good in the most socially efficient manner. According to Picciotto (1995), what matters in addition to excludability and rivalry, is the degree to which production efficiency relies on local knowledge – a characteristic Picciotto termed “voice.” Since producers are often the users of the knowledge developed from research, they are often best suited to make the decisions regarding research production and provision.

Ronald Coase made similar arguments in his 1974 article entitled, “The Lighthouse in Economics,” which examined the governance structure of lighthouse services in Britain. Coase (1974) argued that even though lighthouse services generally fit the criteria of a public good, a system where the users of lighthouse services fund (through dues) and direct its provision may be superior. Like Picciotto (1995), Coase (1974) explained that users of lighthouse services are generally better suited to make decisions regarding the provision of lighthouse services since they have specific knowledge of their lighthouse service needs and a vested interest in the benefit and cost of its provision.

Finally, check-offs are a relatively inexpensive source of funding for research from society’s perspective (Alston and Pardey 1999). Fullerton (1991) estimated that raising one dollar through general taxation costs society between US\$1.07 and US\$1.25 (Alston and Pardey 1999). This cost reflects the deadweight loss that occurs when markets are taxed. Since check-

off rates are typically set far lower than the rates taxpayers are subject to, the deadweight loss to society per dollar of research funding raised through check-offs is likely lower than it is with general taxation (Alston and Pardey 1999). In this sense, check-offs are a relatively inexpensive source of funds from society's perspective.

In summary, check-offs align the interests of producers, consumers, and society as a whole. They give farmers a voice in the agricultural research and development process, which is beneficial to society when the efficient production of research requires some degree of local knowledge. Check-offs are an inexpensive way to raise funding for research since the deadweight loss to society is low compared to other alternative funding sources such as general taxation. These features make check-offs an attractive way to fund and direct certain types of agricultural research from society's perspective.

3.4 Putting the Research Question into Context

The specific issue examined in this thesis is whether commissions suffer from institutional lock-in that inhibits their ability to switch to non-refundable check-offs. The theory of institutional lock-in is discussed in greater detail in Chapter 4. The following concepts underlie this inquiry. By switching from refundable to non-refundable levies, crop development agencies would eliminate farmers' ability to request refunds of their check-off contributions. This would potentially give commissions more freedom to increase their check-off rate and fund research at higher levels. Despite these apparent advantages, no commission to date has attempted to switch. There are a number of theories regarding why commissions have not pursued non-refundable check-offs. One theory is that commissions are locked in to their current practices.

Before proceeding with the examination of lock-in, it is important to understand three things. First, there are a number of possible reasons why producers spend too little on research.

Farmer free-riding is not the only possible explanation; therefore, fixing the free-rider problem will not necessarily fix the underinvestment problem. Second, whether switching to non-refundable levies would necessarily reduce the overall level of farmer free-riding is debatable. Refund requests are only one form of farmer free-riding, and producers could free-ride in other ways that could undermine agencies' ability to increase levy rates (Campbell et al. 2007). Third, institutional lock-in is only one possible explanation for commissions' apparent bias for the status quo. If the notion that non-refundable check-offs are a more effective tool for generating funding for research is accepted, then there may be other reasons why commissions are stuck.

To put the research question into context, this section examines the possible reasons why producers spend too little on research and why producers and the check-off agencies that represent them have failed to switch to what seem to be more effective check-off mechanisms. This section also re-examines the arguments that serve as the basis for this study, namely: (1) the threat of excessive refund requests causes commissions to set sub-optimally low check-off rates from a producer profit-maximizing perspective, and (2) switching to non-refundable levies will increase agencies' ability to fund research at higher levels.

3.4.1 Producer Underinvestment

The high returns to producers' investments in crop research discussed above, combined with the low absolute levels of investment shown in Chapters 1 and 2, suggest farmers spend too little on research from a profit-maximizing perspective. To put the producer underinvestment problem into context, consider this: at check-off and research investment rates of 0.5 per cent and 0.1 per cent of the gross value of the commodity respectively (these are typical rates in Saskatchewan), a producer selling a commodity worth \$300 per tonne would pay \$1.50 per tonne check-off fee of which \$0.30 per tonne would be invested in research on his/her behalf. Given

that studies have concluded that farmers have received between \$4.40 and \$20.20 per dollar invested in crop research, the producer underinvestment problem seems to be severe.

Perhaps producers' underinvest in research because they are generally unaware of the benefits of research. Results from a separate experiment conducted by Professor Gray (supervisor) and Eric Froystad (researcher) support this hypothesis.¹² The exercise was conducted on a small group of producers who belong to marketing club in a farming community in southern Saskatchewan. The group agreed to participate in the exercise and engage in a discussion regarding check-offs in return for a market outlook presentation by Professor Gray.

In the experiment, participants filled out a questionnaire that asked them to indicate their preferred check-off rate and check-off type (refundable or non-refundable) for the various crops they grow as listed on a multiple-choice menu. After the participants completed the questionnaire, Professor Gray presented information regarding documented rates of return to research, alternative research funding systems, and research funding levels in other jurisdictions. Once the information session was complete, participants were asked to fill out a second survey that was identical to the first to see if their answers changed.

The results of the exercise showed that, on average, participants' preferences for higher check-off rates and non-refundable check-offs increased after the information session. These results suggest not only that information plays a role in producers' check-off preferences but that producers might support higher check-off rates and non-refundable check-offs if they were better informed of the benefits of research and these check-off programs. Perhaps check-off agencies are not doing enough to inform their members of the economic benefits of research. A summary of the exercise and its results can be found in Appendix B and a sample of the questionnaire used in the exercise can be found in Appendix C.

¹² This experiment received ethics approval from the University of Saskatchewan.

In farmers' defence, there are at least two reasons why they may be generally unaware of the benefits of research. First, crop research benefits are often difficult to observe and attributed to other factors such as changes in farming practices and weather patterns. Second, there have only been a few academic studies that specifically examine returns to producers. Studies such as Gray and Scott (2003), Gray et al. (2008), and Scott et al. (2005), examined returns to pulse, wheat, and barley research, but similar studies on producer returns to canola or flax research are for the most part, absent. Perhaps the lack of economic studies and extension services has caused producer organizations to underestimate research benefits and made them unwilling to support additional investment.

Another potential reason for low investment levels among crop research agencies may be inadequate access to research infrastructure. Perhaps some agencies have limited opportunities to invest in research as a result of too few plant breeders, labs, etc. That being said, it could also be argued that a lack of research infrastructure is another reason why research organizations would want to find ways to raise additional research funds.

Additional investment in research may not be warranted if rates of return to other activities such as market development, producer advocacy, and producer education exceed that of research. However, while this argument may partially explain why research expenditures have remained relatively low it does not explain why check-off rates have remained low. If underinvestment exists for a number of activities, there would be an even greater incentive to increase check-off rates.

High levels of public investment may be "crowding out" producer investment (Malla and Gray 2005). If the government is heavily involved in funding research there may be no economic rationale for a producer group to increase their level of investment. However, if this

hypothesis is true, then a low the rate of return on public investment should be evident, which is not supported in the findings of numerous rate-of-return studies.

Farmers may fear that additional producer investment would result in reduced public investment in research. This attitude may stem from the fact that reductions in public support for plant breeding were one of the catalysts for the establishment of producer check-offs in the first place.¹³

Producer-controlled crop development agencies may suffer from the “horizon problem” (Cook 1995). The horizon problem, in the context of an agricultural co-operative, occurs when the period of time during which the members of the co-operative can make residual claims on a productive asset are shorter than the productive life of the asset (Cook 1995). This misalignment of time horizons creates a disincentive for members’ to invest in growth opportunities (Cook 1995). Often, crop research benefits are realized decades after the initial costs are incurred.¹⁴ For this reason, some economists have described agricultural research as “slow magic” (Pardey and Beintema 2001). The median age of farm operators in Saskatchewan was 53 years in 2005 (Statistics Canada 2006). This means that some producers paying for research may never realize the benefits. Given the time lag between research cost and benefits, producers nearing retirement may be unwilling to invest more in research. From this perspective, it is easy to understand why some farmers would not support additional investments in crop research.

In addition to age, producers and the farms they operate are heterogeneous in such respects as farm size, commodities produced, and soil and climate conditions. These differences could also affect producers’ ability to benefit from crop research and their attitudes toward research funding.

¹³ In Australia the government made commitments to match industry levies to avoid this perception.

¹⁴ Alston et al. (2010) found that agricultural research in the United States has its peak impact twenty-five years after the research expenditure was made.

Regional spillovers may contribute to underinvestment (Evenson 1989; Harris and Lloyd 1991). In some cases, research funded by a producer group in one region could result in knowledge that producers in other region can use freely. These spillovers may reduce the incentive to fund these types of research and contribute to producer underinvestment.

The final argument, and the argument that this study is based on, regarding why producers underfund crop research from a profit-maximizing perspective, is that producer underinvestment in crop research is at least partly due to the refundable nature of check-offs. In a refundable check-off system, producers are able to free-ride by requesting a refund of their check-off contribution. Free-riding, in the context of crop research, occurs when those who benefit from the research do so without paying for it. Farmers, whether they perceive a value to the research or not, have no incentive – in a strict economic sense – to contribute, since any farmer can access the research benefits that stem from the check-off without paying the check-off. Referring back to Figure 3.2, with a check-off in place, a free-riding producer's cost structure would not increase by t ; however, the producers would still enjoy the cost per unit reduction of k .

In theory, producers' ability to free-ride on other producers' research contributions in a refundable check-off system limits agencies' ability to increase check-off rates since an increase in levy may trigger excessive refund requests (Campbell et al. 2007). Agencies that administer non-refundable check-offs, such as the Saskatchewan Pulse Growers, do not have this constraint when making their check-off rate decision. According to Campbell et al. (2007), “the non-refundable nature of pulse crop levies helps to explain partially why pulse growers systematically contribute higher amounts to R&D than producers in comparable sectors.” It

therefore seems the fact that the only non-refundable crop research check-off is also the leader with respect to contribution rates and research-funding levels is not merely a coincidence.

While not particularly apparent at low check-off rates, the free-rider problem could become more significant at higher check-off rates. Refund rates among refundable agencies are generally low, in most cases ranging between 5 and 7 per cent. This suggests that free riding is not a significant issue; however, refund levels are not a perfect proxy for free-riding. Farmer free-riding at very low levy rates is limited by the transactions costs of obtaining a levy refund. As mentioned in Chapter 1, the average alfalfa seed, pulse, canola, and flax producer spent roughly \$177, \$88, \$12, and \$11 per year through their respective check-off programs between 2000 and 2004 (Campbell et. al 2007). Given these very low annual costs, producers may find that they cannot afford the time necessary to find the information and go through the steps required to request a refund, even if they perceived no benefit from the research.

In summary, producer underinvestment in crop research is a complex issue. There are many possible reasons why, despite evidence of producer underinvestment, producers and the check-off agencies that represent them continue to spend too little on research. Part of the answer may lie in the refundable nature of check-offs. Even though switching to non-refundable check-offs is likely not a “silver bullet” solution to the producer underinvestment problem, it would potentially mitigate producers’ ability to free-ride, at least theoretically explaining why check-off rates among commissions have not increased by any significant measure. Thus, the barriers to switching from development commission to development board may inform the question of why producers underinvest and are therefore worth examining. This final consideration motivated the examination of the conversion from commission to a board.

3.4.2 Commissions' Failure to Convert

If it is accepted that non-refundable check-offs are more effective than refundable check-offs at generating funding for research, then why have commissions failed to make the switch? There are some very interesting theories that may help explain this phenomenon.

One theory from the field of behavioural economics that may help explain commissions' apparent bias to the status quo is the endowment effect theory. The endowment effect occurs when an individual places a higher value on an asset once the individual has acquired property rights over the asset (Thaler 1980). Perhaps those involved in the establishment and operation of a commission feel some sense of ownership over it and have therefore placed a high value on it. If commission directors, for example, suffer from the endowment effect, their perceived payoff to switching from refundable to non-refundable must be not only greater but sufficiently greater than the payoffs to the status quo in order to motivate change.

Another theory that may explain commissions' apparent status quo bias is cognitive dissonance (Festinger 1957 and Akerlof and Dickens 1982). Cognitive dissonance refers to the unpleasant feeling one gets when holding two contradictory ideas. Perhaps directors believe check-off reform would be beneficial but also believe reform could not be achieved. In an attempt to reconcile the two conflicting ideas and reduce the dissonance they feel, they rationalize staying with the status quo by convincing themselves and others that switching is not a worthwhile venture.

As well, the principal-agent problem may partially explain why commissions' fail to convert to boards. The principle-agent problem occurs when an agent working on behalf of a principal undertakes an action which the principal cannot observe and reduces the total amount consumption that can be divided between the two because it is advantageous for the agent to do so (Grossman and Hart 1983). In the context of research check-offs, farmers are the principals

and the check-off program's management (i.e., farmer-elected and executive directors), are the agents. Perhaps commissions' failure to switch to non-refundable check-offs is a reflection of information asymmetry and opportunistic behaviour on the part of check-off management.

3.5 Summary and Conclusions

Empirical studies consistently show high rates of return on investment in agricultural research which suggests agricultural research, in general, tends to be underfunded from society's perspective. Private underinvestment in agricultural research is often attributed to the non-excludable and non-rival nature of the knowledge research creates. One way governments attempt to induce additional private investment is by creating institutional arrangements that facilitate collective action by producers. Commodity check-off programs are examples of this strategy. Despite the sizable benefits of research, producers tend to underinvest and there are a number of possible reasons why. The broad adoption and continued operation of refundable check-offs is one potentially important reason. While the need for check-off reform is apparently needed, it has not yet occurred. Chapter 4 develops a theoretical framework to examine why check-off agencies continue to administer refundable check-offs rather than switching to non-refundable check-offs.

CHAPTER 4: THEORETICAL FRAMEWORK AND LITERATURE REVIEW

4.1 Introduction

As suggested in Chapter 3, producer underinvestment in crop research may be related to the choice to administer refundable check-offs. Why then, do development commissions continue to administer refundable check-offs when they apparently have the ability to switch to development boards and administer non-refundable check-offs? In this chapter, the theory of institutional change, which examines the creation, evolution, and choice of institutions, is used to develop a theoretical framework to inform this question.

The remainder of this chapter is organized in three sections. Section 4.2, “North’s Framework of Institutional Change,” examines Douglass C. North’s theory of institutional change.¹⁵ Section 4.3, “Arthur’s Framework of Technological Change,” describes W. Brian Arthur’s theory of technological change, upon which North’s theory of institutional change is partially based. Four propositions based on the theories and concepts presented in the preceding sections are stated in the final section entitled, “Summary, Conclusions, and Propositions to Test.” The validity of each proposition is tested in Chapter 5 using empirical evidence from producer check-off organizations.

4.2 North’s Framework of Institutional Change

According to North, the process of institutional change is incremental, continuous, and path dependent. It is endogenous; institutions alter organizations, which, in turn, alter institutions, and so on. The path of institutional change does not necessarily lead to socially efficient outcomes and socially inefficient paths of development may persist and become “locked in” over time (North 1990).

¹⁵ Douglass C. North received the Nobel Prize in Economics in 1993 for his work in the field of economic history (Nobel Prize website).

According to North, “The continuous interaction between institutions and organizations in the economic setting of scarcity and hence competition is the key to institutional change” (1992, p. 4). Institutions are the rules of the game – humanly devised constraints that structure human interaction (North 1990). Institutions include formal rules such as laws, acts, and constitutions; informal social norms of behaviour such as conventions, traditions, customs, and codes of conduct; and the enforcement characteristics of each (North 1990). Institutional, budgetary, technological and other economic constraints determine pay-offs in society. These constraints define the way the game is played. The role of institutions in society is to facilitate exchange between economic agents by reducing uncertainty and transaction costs (North 1990).

Transactions, according to Williamson, occur “whenever a good or service is transferred across a technologically separable interface” (1985, p. 1). The term “transaction costs” has many definitions. For example, Coase described transaction costs as “the cost of using the price mechanism” (1937, p. 390). Williamson thought of transaction costs as “the economic equivalent to friction in physical systems” (1985, p. 19). Furubotn and Richter define transaction costs as “the costs of resources utilized for the creation, maintenance, use, and change of institutions and organizations” (1997, p. 40).

Organizations are the players of the game; “groups of individuals bound by some common interest to achieve objectives” (North 1990, p. 5). Organizations include economic bodies such as firms, unions, and co-operatives; political bodies such as political parties, governments, and regulatory agencies; and educational bodies such as schools, universities, and colleges (North 1990). Generally speaking, the objective of an organization is to maximize member welfare or, using North’s sports analogy, to win the game (North 1990).

The types of organizations that arise, and the way they evolve, reflect the incentives embedded in the institutional framework (North 1994). Since resources are scarce and competition is pervasive, to survive, organizations must continually invest in the skills and knowledge that have the greatest payoff (North 1994). However, this does not mean that organizations will necessarily engage in socially productive activities. According to North,

If the highest rate of return in a society is to be made from piracy, then organizations will invest in knowledge and skills that will make them better pirates; if organizations realize the highest payoffs by increasing productivity then they will invest in skills and knowledge to achieve that objective. (1994, p. 3)

Organizations' welfare-maximizing behaviour continually alters the institutional framework. Institutions change when entrepreneurs – the decision makers in organizations – perceive that altering the rules is superior to working within them (North 1994). The decision to enact change is typically driven by changes in relative prices, tastes, and/or preferences (North 1990). Organizations will invest in changing formal rules – through lobbying political organizations for example – when it is perceived to be in the best interest of the organization. Informal constraints such as social norms of behaviour and codes of conduct will gradually change as the formal rules change.

As the rules of the game change, so do individuals' perceptions of the relative payoffs to different choices. The way players interpret and process information evolves as they learn and develop skills that help them take advantage of the new rules (North 1993).

Inefficient institutional arrangements can arise and become locked in. According to North, "there are two forces shaping the path of institutional change: increasing returns and imperfect markets characterized by significant transaction costs" (1990, p. 95). In a world with zero transaction costs, institutions do not affect economic outcomes (1990). However in reality, transaction costs are not zero and thus do affect economic outcomes.

Transaction costs arise because “information is costly and asymmetrically held by the parties to exchange” (North 1992, p.4). Markets, both economic and political, are not perfect. Agents often make decisions based on partial and sometimes incorrect information. Inefficient property rights or institutions arise as a result.

Inefficient institutions can become locked in as a result of increasing returns (North 1990). The process of institutional change creates an interdependent web of institutions and organizations (both political and economic), which North refers to as an “institutional matrix.” System self-reinforcement arises as a result of the symbiotic relationship between institutions and organizations. This self-reinforcement biases the choices of individuals and organizations within the institutional matrix in favour of policies that are generally consistent with the status quo (North 1990). Economies of scope, complementarities, and network externalities make the process of institutional change incremental and path dependent (North 1993). Organizations that arise and have bargaining power as a result of the incentive structure inherent in the institutional framework typically have a vested interest in perpetuating the institutions that got them to where they are (North 1993).

North’s concepts of institutional self-reinforcement, path dependence, and lock-in were based on ideas from Arthur (1988) who examined sources of technological self-reinforcement, path dependence, and lock-in. Arthur’s (1988) sources of technological lock-in, which are discussed in greater detail below, are large set-up costs, learning effects, coordination effects, and adaptive expectations. North (1990) claimed creating institutions typically involves significant set-up costs that create economies of scale. Learning effects occur as organizations acquire skills and knowledge that helps them exploit the opportunities provided by the institutional framework. Organizations coordinate their actions and behaviours with other

organizations through contracts and investments in complementary activities which create coordination effects. Adaptive expectations arise as the increased prevalence of contracting forms expectations that future contracting will be possible under a similar institutional framework (North 1990). North concludes that “the interdependent web of an institutional matrix produces massive increasing returns” (1990, p. 95).

With increasing returns and imperfect markets characterized by high transaction costs, the subjective models of actors modified both by very imperfect feedback and by ideology will shape the path. Then, not only can both divergent paths and persistently poor performance prevail, the historically derived perceptions of the actors shape the choices they make. (North 1990, p. 95–96)

To better understand North’s theory of institutional change, it is useful to understand W. Brian Arthur’s theory of technological change.

4.3. Arthur’s Framework of Technological Change

North’s theory of institutional change, specifically, his concept of institutional lock-in, was based on W. Brian Arthur’s theory of technological change. This section examines Arthur’s framework of technological change as it provides additional insight into North’s theory of institutional change and further develops the theoretical framework for analyzing producer-controlled crop research check-offs.

4.3.1 Arthur’s Model

Arthur, in his influential 1989 article, “Competing Technologies, Increasing Returns, and Lock-in by Historical Events,” developed a simple model to examine the adoption process of two competing technologies in the presence of increasing returns to adoption. The model consists of two new-to-market technologies – technology A and technology B – and two types of potential adopters – type R and type S. The total number of adopters is large and there is an equal number of each type. R-agents have a natural preference for technology A, thus, $a_R > b_R$. S-agents have

a natural preference for technology B, hence, $b_S > a_S$ (see Table 4-1). The adoption process is sequential and the order in which R-agents and S-agents choose a technology is random. Agents are fully informed of the relative payoffs to adoption and always choose the technology with the greatest return.

Table 4-1. Returns to Choosing A or B given Previous Adoptions

	Technology A	Technology B
R-agent	$a_R + rn_A$	$b_R + rn_B$
S-agent	$a_S + sn_A$	$b_S + sn_B$

Source: Arthur (1989, p.118)

An agent's return to adopting a particular technology increases as the number of previous adopters of the technology increases. The variables r and s shown in Table 3-1 express the nature of the relationship between the returns to adopting a technology and the number of previous adopters. In this particular case, both variables are assumed to be positive to reflect the increasing-return nature of adoption. Variables n_A and n_B in Table 4-1 represent the number of previous adopters of technologies A and B respectively.

With increasing returns, agents will not necessarily choose their preferred technology. For example, R-agents will begin choosing technology B even though technology A is their preferred technology when a sufficient number of previous adopters have also chosen technology B, and vice versa. Once this tipping point in the adoption process is reached, each agent thereafter will choose the same technology. Therefore, the adoption process becomes a "random walk with absorbing barriers" as shown in figure 4-1 (Arthur 1989, p.121).

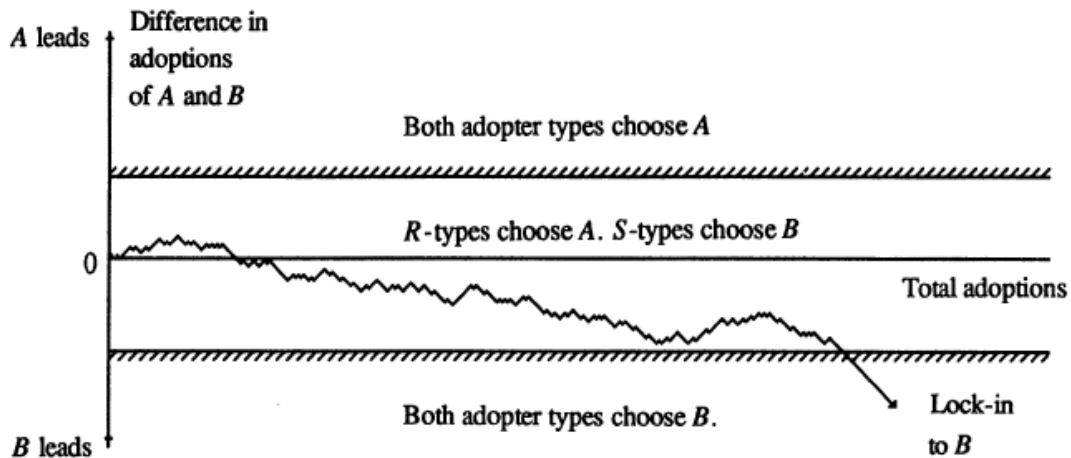


Figure 4-1: Increasing Returns Adoption: A Random Walk with Absorbing Barriers

Source: Arthur (1989, p.120)

Arthur (1989) found that the adoption process under increasing returns to adoption possessed the following properties:

1. Multiple equilibria. With increasing returns to adoption, multiple market share outcomes are possible. Eventually technology A or technology B will capture 100 per cent of the market share; however, it is not clear which of the two technologies will win. More than one outcome is possible; therefore, multiple equilibria exist.
2. Possible inefficiency. With increasing returns, the technology that would provide the maximum possible benefit is not necessarily the one that is eventually chosen. If the superior technology has bad luck gaining market share early on, the inferior alternative may accumulate enough of an advantage that the superior technology can no longer compete.
3. Path Dependent. With increasing returns to adoption, the adoption process is path dependent. In Arthur's model, the order in which adopters choose matters. If a sufficiently large number of R-agents choose before S-agents, then the payoffs to

adopting technology A will increase to the point where S-agents will also choose technology A. Under the condition of increasing returns, small, seemingly unimportant events, such as the decision regarding the order in which agents adopt, can determine the eventual outcome.

4. Lock-in. With increasing returns to adoption, the technology that moves ahead in market share may eventually become locked in. The path of adoption becomes more and more difficult to reverse as overall adoption increases.

In summary, Arthur (1989) showed that when two technologies, each exhibiting increasing returns to adoption, compete for market share, the outcome is unpredictable, the superior technology does not necessarily win, small events can tip the adoption process in favour of one technology over another, and the eventual winner may become locked in.

4.3.2 Arthur's Sources of Lock-in

Arthur (1988) identified four generic sources of technological self-reinforcement and lock-in. North (1990) later argued that each of these sources also create institutional lock-in.

Arthur's (1988) four sources are as follows:

1. Large set-up costs. Large set-up or fixed costs to establishing an economic system are a self-reinforcing mechanism because they can lead to unit cost reductions with increased production.
2. Learning effects. Learning effects occur when agents acquire skills and knowledge that improve the overall performance of an economic system.
3. Coordination effects. Coordination effects occur when there are benefits to going along with others.
4. Adaptive expectations. Adaptive expectations occur when the increased prevalence of a technology on the market leads to beliefs of further prevalence.

4.3.3 Escaping Lock-in

The ability to escape lock-in depends on the “source of the self-reinforcing mechanism” and “the degree to which the advantages accrued by the inferior ‘equilibrium’ are reversible or transferable to an alternative one” (Arthur 1988, p. 16). When large set-up costs and learning effects are the sources of self-reinforcement, the benefits are often not reversible or transferable, making it difficult to escape from the locked-in position (Arthur 1988). However, when coordination effects are the source, the ability to escape lock-in depends on the degree of certainty each user has with respect to the preferences of the other users (Farrell and Saloner 1985, 1986). If users who prefer to switch are certain that the other users also prefer to switch, they will do so independently; presumably, at low cost. However, if users are uncertain whether or not other users prefer to switch, then the installed base may remain locked in as switching would be costly. According to Arthur, “each user would benefit from switching to the other standard, as long as others go along, but individually none dare to change in case others do not follow” (1988, p.16). With uncertainty, transferability of coordination benefits is difficult to achieve and coordination failure results.

4.4 Summary, Conclusions, and Propositions to Test

North describes institutional change as an endogenous process. Institutions determine the payoffs in society and therefore affect the types of organizations that arise. Organizations invest in skills and knowledge in an attempt to capitalize on the opportunities provided by the existing institutional framework. Through their maximizing behaviour, organizations incrementally alter the institutional framework at the margins they perceive have the greatest payoff. Imperfect markets, characterized by significant transaction costs, mean that inefficient property rights can arise. Increasing returns to institutions make the process of institutional change path dependent

and subject to lock-in. Together, transaction costs and increasing returns mean that inefficient institutions can persist over time.

Arthur showed how increasing returns create multiple equilibria, possible inefficiency, path dependence, and lock-in. Arthur also identified four sources of lock-in – large set-up costs, learning effects, coordination effects, and adaptive expectations. In regard to escaping lock-in, Arthur (1988) stressed the importance of the reversibility and transferability of the benefits that increasing returns provide. While self-reinforcing mechanisms cause lock-in, the ability to escape lock-in depends on the degree to which the advantages these mechanisms create are reversible or transferable to an alternative equilibrium.

Evidence presented in this thesis suggests commissions may suffer from lock-in. Theoretical and anecdotal evidence supports the notion that switching to non-refundable check-offs may allow producer-controlled crop development organizations to fund research at higher levels. Yet to date, none have switched, suggesting that these organizations may be locked in to administering refundable check-offs.

There are at least two ways to examine lock-in. One way is to examine how a system that seems to be locked in became locked in over time. The lock-in story, in this case, would be a dynamic one. In the context of crop development agencies, this approach would involve examining the histories of the commissions and the check-off system as a whole with a focus on how they got to where they are.

Another way to examine lock-in would be to take a more static or steady-state approach. In this case, the focus would be more on whether the system as it is today can change, as opposed to how the system became locked in. The current locked-in state of the system would therefore be the starting point with this approach.

While it would be interesting to explore the more dynamic story of how these check-offs evolved, the more static approach was taken. To test the lock-in hypothesis, the presence of the sources of lock-in outlined above was examined. The analysis was framed in the test of four hypotheses; each one related to one of Arthur's self-reinforcing mechanisms. Each proposition presented below was tested and presented in Chapter 5. The identification of the sources of check-off lock-in not only informs the question of whether commissions are locked in, it facilitates a discussion of policy measures that could be used to escape lock-in.

Proposition 1: Large set-up or fixed costs contribute to check-off lock-in. If the cost of setting up a refundable check-off are large and cannot be transferred to a non-refundable system, then large set-up costs contribute to check-off lock-in.

Proposition 2: Learning effects contribute to check-off lock-in. If experience leads to the acquisition of knowledge and skills that improve the overall performance of the established refundable check-off system, and these improvements are not transferable to a non-refundable system, then learning effects contribute to check-off lock-in.

Proposition 3: Coordination effects contribute to check-off lock-in. If there are benefits from coordinating the establishment and operation of a refundable check-off system, and these benefits are not transferable to a non-refundable check-off system, then coordination effects contribute to check-off lock-in.

Proposition 4: Adaptive expectations contribute to check-off lock-in. If the increased prevalence of refundable check-offs enhances the belief of further prevalence, then adaptive expectations contribute to check-off lock-in.

CHAPTER 5: ANALYSIS AND RESULTS

5.1 Introduction

A qualitative analysis was conducted to test the four propositions stated in Chapter 4. Data for the analysis were collected through personal interviews with key informants and external review of publicly available information. This chapter discusses the methodology of the study and presents the results of the analysis. The remainder of this chapter is divided into six sections. Section 5.2 discusses the methodology and data collection methods used in the study. Section 5.3 examines the validity of Proposition 1: Large set-up costs contribute to check-off lock-in. Section 5.4 examines the validity of Proposition 2: Learning effects contribute to check-off lock-in. Section 5.5 examines the validity of Proposition 3: Coordination effects contribute to check-off lock-in. Section 5.6 examines the validity of Proposition 4: Adaptive expectations contribute to check-off lock-in. Section 5.7 summarizes the findings from each of the four previous sections. Final conclusions and a discussion on the policy implications of the findings are reported in Chapter 6.

5.2 Methodology and Data Collection

The hypothesis is that development commissions suffer from institutional lock-in that inhibits conversion from a commission to a board. To test this hypothesis, four propositions based on Arthur's taxonomy of sources of lock-in – large set-up costs, learning effects, coordination effects, and adaptive expectations – were examined systematically. Published information and qualitative data collected from interviews with individuals involved in crop research check-off organizations was analyzed to examine each proposition.

Interviews with 18 individuals were conducted to collect information for the study. Executive and farmer-elected directors of crop development commissions and a member of the Agri-Food Council were interviewed either in person or over the phone. Interviewees had

knowledge of specific events and facts that could contribute to lock-in. Perhaps more importantly, these individuals and individuals like them are responsible for making decisions regarding check-off reform; therefore, their perceptions are very important for the change process.

The interviews were structured in a similar way, but varied somewhat as particular responses warranted additional follow-up questions and discussion. While interviews were structured to elicit a clear picture of the participants' perceptions regarding the four propositions, there was enough flexibility in the qualitative process to allow respondents to discuss a broader range of issues.

The interview process was developed to be consistent with University Standards and received Ethics approval from the University of Saskatchewan. All participants signed a consent form as reproduced in Appendix D. All interviews were audio recorded and all were transcribed except one, which could not be transcribed due to poor audio quality. The average interview took approximately one hour. The recordings and transcripts are securely stored according to University policy.

After two separate and interesting experiences, a deliberate decision was made to interview only those directly involved in check-off organizations. The first experience occurred at an annual crop production show in Saskatoon while attempting to survey producers on their attitudes toward check-offs. Many farmers approached at the show were very reluctant to discuss their attitudes about check-offs and indicated they had virtually no knowledge of research check-offs, including whether or not they had contributed to check-off programs in the past.

The second experience was the experiment on informational impacts on producers' check-off preferences mentioned in section 3.4.1. The results of this experiment suggested that information regarding the benefits of research has a positive impact on producer support for higher check-off rates and non-refundable check-offs. The results of this experiment also suggested that producers are largely uninformed of the benefits of crop research and check-offs in general. This finding was consistent with what researcher Eric Froystad and supervisor Dr. Richard Gray found after the attempt to survey farmers at the crop production show in Saskatoon.

These two experiences, combined with the fact that producers would only be involved in a decision to change check-offs after a period of engagement that would alter their information sets and perceptions, suggested that it was important to discuss research check-offs with those directly involved in producer check-off organizations. The leaders of check-off organizations would have to initiate any process of change and as such are key agents of change.

5.3 Proposition 1: Large set-up costs contribute to check-off lock-in.

The evidence collected in this study supports Proposition 1 – large set-up costs contribute to check-off lock-in. Information gathered through a review of the legislation regarding the establishment of a development commission, as well as through interviews with key informants, suggested establishing a refundable check-off is a time consuming, complex, and arduous process that involves considerable risk. Evidence also indicated switching from a commission to a board requires significant resources and groups must go through a process similar to that of establishing a commission in the first place. Since there are large fixed costs to establishing a refundable check-off, and groups must reinvest significant resources to switch to a non-refundable check-off, large set-up costs contribute to check-off lock-in.

5.3.1 Establishing a Development Commission

Before a group of producers can legally begin collecting a refundable check-off in Saskatchewan, they must first establish themselves as a development commission. The process for establishing a development commission is defined in the provincial Agri-Food Regulations, 2004.

The first step for a group seeking the establishment of a development commission is to file a request and submit a proposed plan to the provincial Minister of Agriculture. The proposal must include a detailed description of the proposed plan; the proposed membership of an interim board of directors to administer the plan until the first election of a board of directors; a list of the proposed powers of the agency; the fiscal year of the agency; and any other information the Minister deems necessary, such as the grade or class of product that is to be promoted, developed, or regulated; the objectives of the plan; who and what areas of Saskatchewan would be affected by the plan; who would be exempt from the plan; and a detailed description of how the check-off is to be collected, administered, and audited (Government of Saskatchewan website a).

Once the proposal is developed and submitted to the Minister, it is forwarded to the Agri-Food Council for review. During this stage, the Council may meet with proponents of the plan; request further information on the proposal, including details on what portion of the industry would be affected by the plan (in terms of the number of producers and the acreage); request information; and/or hold public hearings for the purpose of receiving representations supporting or opposing the establishment of the plan. Proponents are required to demonstrate to the Council the level of industry support for the proposed plan. Once the Council's review of the proposal is complete, the Council recommends to the Minister that either, the plan should be established

without a vote of producers, the plan should not be established, or a vote of producers should be held (Government of Saskatchewan 2004b).

The rules state that if a producer plebiscite is held, 60 per cent of producers who vote must vote in favour of the proposed plan for it to be eligible for establishment. However, the Minister has the power to impose additional constraints on the vote. For example, the Minister may set the minimum number of votes required to be cast, or the percentage of the producers eligible to vote that must vote, in order for the vote to be valid. If a valid vote is held and the results indicate a sufficient level of producer support for the plan, the Minister may either recommend the establishment of the plan or decide that the plan should not be established (Government of Saskatchewan 2004b).

Responses from those interviewed suggested the process for establishing a development commission is difficult, time consuming, and requires significant resources. When describing the effort that was required to create a check-off, one interviewee said, “We went to great lengths...and I’m sure the other Commissions did as well.”¹⁶ Another interviewee said, “It took a lot of work and a long time to get it [the Commission] up and established...over a matter of years.”¹⁷

According to one interviewee, one reason why it is difficult to establish a development commission is because it is difficult to find producers willing to serve on a board of directors. The interviewee explained:

Farmer support is a major issue and I think also, with all of these boards [agencies] now; it’s getting extremely difficult to find good people who want to fill positions on boards of directors. The simple reason for that is farms are getting larger...most of the people I see around the board table are in their fifties plus. The odd one is younger. But what is happening is they are just becoming so

¹⁶ Transcript 1.

¹⁷ Transcript 7.

busy with their own operation that they find it very difficult to give any time to these boards [agencies] in the first place.¹⁸

Another interviewee commented on the difficulties of convincing those involved in the decision (farmers, regulators, and politicians) to support a proposed plan, and the risk involved in the establishment process. The interviewee said:

As far as the Agri-Food Council, they need to...be very clear that farmers support it [the plan] and so I know when we were trying to develop the AAA council [Commission], we did a lot of extra meetings. We did a lot more that we felt we needed to, to bring about the AAA Commission. At the end of the day we were still worried that the board [Council] might not side with us. After that, the board [Council] was really concerned that the government might not be onside with it so they wanted us to make sure that both parties were onside and that there would be no ugly questions asked during question period. So yes, there is definitely a political dimension to these things that make it easier or worse. It is definitely a concern because you can go to all this work and the whole thing can get kinda parked because it looks like it might be a “hot potato.”¹⁹

The perception is that the government will only support the creation of a development commission if a significant portion of farmers do not oppose it.

5.3.2 Switching from Commission to Board

The legislation does not clearly define the process for switching from a development commission to a development board. However, since an agency’s regulations give it the power to collect a refundable levy, it is assumed that a development commission would have to amend its regulations to a switch to a development board. The excerpt below, which was taken from the Agri-Food Council website, describes the process for amending agency regulations and orders:

When a Board/Commission wants to amend either its regulations or orders, it must prove to The Agri-Food Council that the recommended changes are not only beneficial, but also necessary and supported by producers. In order to amend regulations, the board must first prove to the Council that the recommended changes are beneficial for the agency (including its producers). Upon convincing the Council that the recommended changes are beneficial and necessary to the agency, the Council will vote to either pass them or not. If accepted, the Council

¹⁸ Transcript 12.

¹⁹ Transcript 6.

then forwards the recommended changes to the provincial government bodies that debates the changes and either recommends further changes, approves the changes or disallows the changes requested. If accepted by the provincial government bodies, the changes are then forwarded to the Executive Council and the Lieutenant Governor in Council for their approval/denial. If approved, the amendments are considered changed on the date of signing by the Lieutenant Governor. (Government of Saskatchewan website a)

Interviewees indicated that switching from commission to board would involve significant time, effort, and resources, and that the process would be similar to the process for establishing a development commission in the first place. According to one interviewee switching to a board is like “starting it all over again only as a ‘mandatory’ [non-refundable] rather than a refundable.”²⁰ The interviewee went on to say, “I don’t see any shortcuts...I don’t see any way that you could shortcut it and make it simple even though you were an operating commission.”²¹

One interviewee described the process for switching as “a very significant...[and] ...difficult administrative procedure to go through.”²² The interviewee added that the perception is that once a refundable check-off agency is established, “it’s sort of fixed in law that it’s a refundable one [check-off] and away we go.”²³ Switching to a development board “requires a very long procedure and, in short form, a lot of red tape.”²⁴

Switching from commission to board, in another interviewee’s opinion, “would take like a tremendous amount of energy and resources from both the board of directors and staff of the organization.”²⁵ This interviewee felt that the chances of being successful in a bid to switch were not great enough “to put that much energy behind that.”²⁶

²⁰ Transcript 6.

²¹ Transcript 6.

²² Transcript 17.

²³ Transcript 17.

²⁴ Transcript 17.

²⁵ Transcript 9.

²⁶ Transcript 9.

Another interviewee said that switching would involve “a long row of a lot of work and at very significant expense.... [A] lot of this work would be primarily done by paid employees out of the Commission and it would chalk up a lot of hours.”²⁷

Other interviewees also suggested that the process for switching was too onerous to pursue. One interviewee said,

To try get the levy non-refundable or to try increase the levy, most of us know how hard it was to get the Commission established in the first place. You just breathe a great big sigh of relief when it’s done because now you can go on doing other things. I think for a number of reasons there is just not the will at the board level to tackle it. Just simply because the time and effort that would be involved.²⁸

Another said,

You could try it [to switch from commission to board] but still it’s the legislation thing. Like your office personnel, I’m not sure what it would take.... I’m not sure the investment would be worth it. It would likely cost us ten thousand bucks in personnel hours to get this thing rolling and then you have the fight on your hands. Status quo is always the easiest to do. It doesn’t cost you anything. It doesn’t take any effort, just stay where you are.²⁹

Switching from refundable to non-refundable involves risk for a commission as significant time and effort can be invested in a campaign to switch and there is no guarantee that the proposal will be passed. When asked why commissions have not altered their check-offs to generate more funding for research one interviewee commented, “I just think that most commissions are, I guess for lack of a better word, scared...because you have to get a producer vote on it.”³⁰ The participant later said, “I guess the reason or the very short answer to the reason why a lot of commissions don’t go out and ask for more money, I think, is because they are afraid it wouldn’t happen.”³¹

²⁷ Transcript 17.

²⁸ Transcript 12.

²⁹ Transcript 14.

³⁰ Transcript 12.

³¹ Transcript 12.

When discussing the risks involved with switching from development commission to development board one participant commented,

I'd have to have a lot of legal counseling and a couple rum before I went out there... If we ask that question and we lost the vote, would we lose the commission? Would we lose the status that we have or would we go back to the status that we have? That would be a huge threat. Huge threat.³²

When asked whether risk is a factor in the decision to switch, one interviewee said,

Bottom line, yes, and some significant benefits would have to be identified before it would be worthwhile taking that risk... I would highly doubt that any of them [other crop development commissions] would make the application to change to a compulsory given the current climate within which we are operating.³³

It should be noted that these interviewee comments reflect a number of issues besides large fixed costs, such as a strong status quo bias and risk aversion on the part of farmers, commissions and the Agri-Food Council. These concepts are discussed in greater depth in Chapter 6.

5.3.3 Proposition 1: Summary and Conclusions

In summary, evidence suggests large set-up costs contribute to check-off lock-in. A review of the steps involved in the process to establish a development commission, as well as evidence from interviews, suggests establishing a refundable check-off is a time consuming, complex, and somewhat arduous process fraught with risk. As such, there are significant fixed costs to establishing a plan, particularly given the producer support requirement. Evidence also suggests that switching from a commission to a board involves going through many of the same regulatory steps over again. Therefore, large set-up costs contribute to check-off lock-in.

³² Transcript 2.

³³ Transcript 17.

5.4 Proposition 2: Learning effects contribute to check-off lock-in.

Learning effects occur when the acquisition of skills and knowledge improves the overall performance of a system. When learning effects are specific to a particular system or process, switching to an alternative can be difficult. However, when knowledge and skills can be easily applied to an alternative process, learning effects do not impede change (Arthur 1988).

Learning effects can occur at multiple levels within a check-off's institutional structure. To examine Proposition 2, this analysis examined learning effects at the producer, commission, and Agri-Food Council level.

Evidence collected in this study does not support Proposition 2 – learning effects contribute to check-off lock-in. Learning at each level of a check-off's institutional structure improves commissions' overall performance; however, these learning effects are transferable to boards and, thus, do not support check-off lock-in.

5.4.1 Producer-level Learning Effects

Evidence suggests learning effects at the producer level do not contribute to check-off lock-in. When a commodity check-off is introduced, producers learn what they are contributing to; what activities their contributions are funding; the rules regarding voting and refund requests; voting deadlines and procedures, etc. According to one interviewee, farmers “go through a process of education” when a check-off is introduced and they learn that “we are taking some money from them for R&D and if they want it back, they can get it back; there is a process to do that.... That was a barrier at first for sure.”³⁴

There are two reasons why producer-level learning effects are not significant sources of check-off lock-in. First, advantages that arise as a result of producer learning are likely small in magnitude. That is, the knowledge and skills that producers acquire through experience with

³⁴ Transcript 1.

refundable check-off programs likely does not improve the overall performance of a commission in a material way. Second, any skills and knowledge that producers acquire through their interactions and transactions with commissions are likely transferable to a board or non-refundable regime. For example, producers would not have to learn new skills to participate in a non-refundable check-off program. Therefore, producer-level learning effects do not contribute to check-off lock-in.

5.4.2 Commission-level Learning Effects

Evidence suggests learning effects at the commission level do not contribute to check-off lock-in. As commission employees and directors gain experience in their roles, they acquire skills and knowledge that make them more efficient at completing their tasks. For directors, allocating funding to research projects is an important and complex function that has to be learned:

We need to make sure that we're picking research projects that fulfill a more pressing need. I mean, there's quite a number of areas where we could spend some research money, but we want to make sure that we're picking the most important ones and in addition to that we also need to consider whether a particular research project is more important than another or not. We need to assess whether there is the opportunity to get better value for that investment than a similar investment on a project that might be more pressing to us, but there's not a research opportunity immediately available. So we, we have to weigh those things.³⁵

One interviewee indicated that the many demands for funding from research agencies make the job of distributing funding difficult. "The question is, even if you raised more money where do we allocate it to? You know, where is it [check-off funding] best spent? Because there are so many demands for research funds from different agencies towards us it's really a juggling game."³⁶

³⁵ Transcript 3.

³⁶ Transcript 4.

Whether producer contributions can be leveraged with complementary funding from industry and/or government agencies is another important consideration for directors when they are allocating funding:

Another aspect of us making decisions about just which projects to fund and how to best spend our money is the opportunity for any matching grants that might be available from other agencies – obviously government being the primary one. But we have to make sure that we’re making best use of those opportunities and coordinating with other research that’s being done: not just specific AAA research, but in other areas that that might compliment what we’re doing from another jurisdiction.³⁷

Experience makes directors more efficient and effective at leveraging producer dollars with government matching grants. Check-off managers and directors learn about the various programs and funding opportunities that are available. They learn how to write proposals, and perhaps most importantly, how to effectively lobby for government support. “You have to make sure that you’re the wheel that gets greased...and you get good at that after a while...you know which buttons to push.”³⁸

Evidence suggests that as directors gain experience the overall performance of a refundable check-off program improves. With experience, directors become more effective at making funding allocation decisions and attracting matching grants to leverage producer contributions. However, these skills are as useful for a director of a development board as they are for a director of a development commission. Since commission-level learning effects are transferable to a board they are not a significant source of check-off lock-in.

5.4.3 Council-level Learning Effects

There is no evidence that learning effects at the Agri-Food Council level support check-off lock-in. One of the Council’s many roles is to assist producer groups with establishing

³⁷ Transcript 3.

³⁸ Transcript 14.

check-offs (Government of Saskatchewan website a). Given the complexity of the process for establishing a commission, as outlined in Section 5.3.1, this role likely requires a certain degree of expertise that comes with experience. Experience has likely improved the Council's capacity to help groups establish refundable check-offs but it has also likely improved the Council's capacity to help groups establish non-refundable check-offs as well since the two processes are very similar. This type of learning is not specific to the establishment of refundable check-offs; therefore, learning effects at the Agri-Food Council level are likely not a significant contributor to check-off lock-in.

5.4.4 Proposition 2: Summary and Conclusions

Evidence collected to analyze learning effects suggests that learning effects are not a significant source of check-off lock-in. Through experience, producers, directors, and council members acquire knowledge and skills that improve the overall performance of their respective refundable check-off programs and the check-off system in general. However, since development boards and commissions are very similar with respect to the way they are established, operate, and organized; these learning effects benefit both commissions and boards. These learning effects are transferable to boards, thus do not contribute to check-off lock-in.

5.5 Proposition 3: Coordination effects contribute to check-off lock-in.

Coordination effects, which occur when there are benefits to going along with others, are a source of lock-in (Arthur 1988). In an institutional context, coordination effects occur when an individual, or a group of individuals, benefits from following a rule as a result of others doing the same. With coordination effects, those not following the rule have an incentive to follow the rule and those already following the rule have an added incentive to continue to do so. This in turn encourages even more participation, creating a cycle of positive feedback. Breaking this cycle becomes increasingly difficult as more individuals coordinate their actions with the group.

Data gathered to analyze Proposition 3, suggests coordination effects contribute to check-off lock-in. Check-off programs have coordinated with one another by structuring their check-off programs in a similar way. Now that refundable check-offs have become the *de facto* standard, it is more difficult for prospective groups to establish themselves as a board or for existing commissions to switch to boards.

5.5.1 Evidence of Coordination Effects

Refundable check-offs have become the *de facto* standard in Saskatchewan. Of the province's nine crop check-off programs, only the pulse check-off – the first check-off established in the province – is non-refundable. Every check-off established since then has taken the refundable route.

There are benefits when agencies structure their check-off mechanisms in a similar way. Producers are often subject to multiple check-offs and, as a result, have come to expect that check-offs operate in a similar manner. Designing a check-off program to be the same as other existing programs can make it easier to attain producer acceptance, thereby reducing the risk associated with establishing a check-off. It is likely less costly for a commodity group to establish a commission and operate a refundable check-off program now that many other commodity groups are doing the same.

Evidence from interviews suggests that some groups designed their check-offs to be the same as others to reduce the risk associated with establishing a check-off. When asked, why did your group adopt a refundable check-off and the levy rate it did, one respondent said,

I think basically it was more just, rather than actually trying to take a look at the true needs for research within the crop, we probably based it more on what other commissions were doing and then what we felt would be palatable at the grower level. You know you could argue that...maybe we should have tried to go a little

higher but you just always have that in the back of your mind...let's get this thing on a level that we can get, that the farmers will support.³⁹

Now that refundable levies have been broadly accepted by the farm community, support for non-refundable levies has diminished. When discussing the topic of support for non-refundable check-offs, one interviewee said,

There is some dissatisfaction in the farm community about the pulse check-off and the fact that it's mandatory and the impression – whether it's right or not, but the perception is out there – that they conduct themselves in a manner that is reflective of the fact that they're aware that it's mandatory – somewhat heavy handed and don't maybe communicate as much and I think part of that is like what I talked about earlier, just because it is a value-based check-off. It is a massive amount of money and for certain growers growing high-risk crops it is like an incredible sum. So, you know all of that does really does speak to...some of the benefits of it all being voluntary across the board. I feel like it's not a level playing field though, you know, it's incongruent completely that the pulse check-off is mandatory and none of the others are.⁴⁰

On the same topic, another interviewee commented,

You made some reference before about...moving to a non-refundable check-off. Absolutely no power and ability at this point in time, and I don't know if there ever will be, in forcing a non-refundable check-off onto the ag community... I think pulse did it back in...and I'm just surprised it hasn't been repealed, but...if we all can't move that direction...they can stay alone by themselves.⁴¹

Reduced support for non-refundable levies makes it more difficult to convince producers, regulators, and politicians to support a switch. Interviewees suggested that generating support for non-refundable levies from farmers would be difficult:

I think we first have to convince farmers, show them the benefit of these producer check-offs. You know, show them that there's a real benefit – long-term and short-term. Convince them. You know, open their minds. So far, we as farmers just see the check-off taken off and that's all we see. That's first and foremost, but we don't think about further down the line what's actually happened with the money. We have to change the attitude first. Like, shift the paradigm.⁴²

³⁹ Transcript 12.

⁴⁰ Transcript 9.

⁴¹ Transcript 10.

⁴² Transcript 4.

Another interviewee suggested that generating support for a non-refundable check-off from directors would be “a major stumbling block”:

I think personally, and I don’t mean to speak for other directors, but I’m not sure that anyone would have this idea that we should change it, that the other directors would entertain the option. So I think first of all they’d have to convince all the other directors in that association, which would be a major stumbling block. Secondly, I don’t know whether anybody is really convinced that it would be a good idea because it hasn’t been a big problem in refunds and thirdly it would, even if you had the whole board convinced, it would still be a long row of a lot of work and at very significant expense because, probably, a lot of this work would be primarily done by paid employees out of the commission and it would chalk up a lot of hours.⁴³

Convincing the government to support check-off reform may also be difficult since producers may view a switch to a non-refundable/mandatory check-off as an infringement on their personal right to choose. When discussing this notion, one interviewee said,

You’ve got both the provincial government of the day at the time and it can be both the opposition and the sitting party that can raise a bunch of stink about this and, therefore, make it a bit of a political “hot potato.” Therefore, no one wants to touch it. So on the political side, yes, it definitely could be a problem.⁴⁴

A lack of support for non-refundable check-offs means that check-off groups would have to be creative in finding ways to garner support for change. One interviewee suggested switching may require an “all-commodity” approach:

I think timing would be important. I think it would also be interesting to see, if people were going to do that...to have an all-commodity [group] going together, and saying, “okay, this is where we are going” and not just directing it to your AAA but also directing it to your BBB.... I think farmer-to-farmer conversation would be extremely important. I think you also have to show...demonstration and grass-root involvement of those farmers would help you move along better.⁴⁵

It may be less costly for a commission to switch if other agencies had already switched or were in the process arguing for change. Coordination among commissions may be not only

⁴³ Transcript 17.

⁴⁴ Transcript 6.

⁴⁵ Transcript 2.

useful but crucial given the need for a coordinated response from farmers. As such, the cost of convincing a sufficient number of producers, directors, regulators, and politicians that change is not only necessary but required, would be greater if it were attempted alone than if it were attempted with others. Once the argument for change has been made, others could follow. One interviewee suggested that if one of the larger refundable check-off programs decided to switch to a non-refundable check-off it “would trigger a wholesale change in looking at all the check-offs and how they’re all doing business”⁴⁶

Change could be imposed by the government; however, for one interviewee, a push for check-off reform would have to come from producers:

Well, I prefer to be top-down simply because that’s the simplest way to do it. In all reality the world doesn’t work that way and I think probably it would have to be a small ground-swell request from the bottom-up. I think is probably how it would have to happen and the government would probably listen and I’m not talking about just the board of directors I’m talking about the, in the case of AAA, if there was 50 per cent of the AAA growers signed a petition or something to that effect. That would be a start.⁴⁷

Later in the interview the study participant added:

I would hope at some point in time the government would get some balls and just declare all check-offs non-refundable. I really think they could do that without a lot of backlash. But I don’t know that...that there’s been a group of commissions that have gotten together to go lobby the government to do that or anything. I’m not aware of it anyway. To me that would be a good start. Just take all of the risk out of it and just make a simple decree that all check-offs are nonrefundable.⁴⁸

5.5.3 Proposition 3: Summary and Conclusions

Evidence collected to analyze coordination effects validates Proposition 3 – coordination effects contribute to check-off lock-in. Commission-style check-offs have become the dominant check-off model in Saskatchewan. These groups structured their check-off programs in a similar

⁴⁶ Transcript 9.

⁴⁷ Transcript 12.

⁴⁸ Transcript 12.

way, which was beneficial as it lowered establishment and operating costs. Interviewees indicated that they based their check-off design decisions on what other agencies had done before them and what they believed producers would accept. Now that the vast majority of check-off agencies operate as commissions, it is more difficult for prospective check-off groups to establish themselves as development boards and for existing commissions to switch to boards. Therefore, coordination effects contribute to check-off lock-in.

5.6 Proposition 4: Adaptive expectations contribute to check-off lock-in.

Adaptive expectations act as a self-reinforcing mechanism when agents adapt their actions and beliefs in ways that help make expected outcomes actual outcomes (Pierson 2000). Adaptive expectations lead to technological lock-in when the increased prevalence of a particular technology on the market enhances agents' beliefs of its superiority over other technologies (Arthur 1988). When increased prevalence of contracting based on a specific set of rules reduces uncertainties regarding the permanence of the rules, adaptive expectations create institutional lock-in (North 1990). Perhaps, the broad adoption and continued operation of refundable check-offs has altered agents' perceptions in a way that reinforces the status quo and thus discourages conversion to non-refundable check-offs. Perhaps, commissions' failure to convert to non-refundable check-offs is, in part, a self-fulfilling prophecy driven by the expectations of the agents involved.

5.6.1 Beliefs Regarding Whether Switching is a Practical Option

Interviewees indicated that the topic of converting to non-refundable check-offs has been rarely, if ever, discussed or considered at the board-of-directors level. While there are many reasons why that might be, responses from interviewees suggested that adaptive expectations are a contributing factor.

According to one interviewee, the topic of converting to a development board is “not something that comes up” at director meetings. The interviewee explained that when the check-off was established, the perception was that “the root of trying to go non-refundable was not practical and open anymore.”⁴⁹

When discussing why conversion is not considered, the interviewee explained,

These are the rules and this is where we’re at...so there’s no thought process of “oh let’s go that route.” The mindset is that the rules are so onerous that that isn’t going to happen.... We’re not going to get it and nobody else setting up a new one is going to get one that’s non-refundable in this environment, but I don’t know how that meshes with the actual rules or what Agri-Food Council would require.⁵⁰

Others believe that producers’ preferences with respect to voluntary versus compulsory farm programs have shifted in favour of voluntary. When asked if there was a chance that any commission would switch from refundable to non-refundable, another interviewee commented,

I think it’s highly unlikely. It seems that if there’s any movement on any of those kinds of issues, whether it is levy collection or any of those kinds of things, I think the general – if there’s a general shift at all – it’s away from things that are mandatory. You know, voluntary participation in farm programs.... I think...any shift that there may be would be away from mandatory provisions and towards a little more flexibility.⁵¹

One interviewee said, “when I listen to some of the federal debate against the Canadian Wheat Board, you know that’s definitely, that’s a line drawn in the sand.... If we were all going to the government today saying we want non-refundable farmer programs would we get it?... I don’t think so.”⁵²

⁴⁹ Transcript 11.

⁵⁰ Transcript 11.

⁵¹ Transcript 3.

⁵² Transcript 2.

Whether a switch from commission to board can be achieved is not known with certainty. However, because directors perceive that switching is not a practical option, the topic is never discussed, which reinforces the belief that switching cannot occur.

5.6.2 Beliefs Regarding Whether Switching is Necessary

The belief that converting from a commission to a board is not practical – either because the rules are too onerous or because preferences for choice have changed – were not the only reasons interviewees gave in regard to why their respective commissions have not considered switching. Some argued that switching is not necessary because they feel current funding and refund levels are acceptable. These arguments were often based on comparisons of current funding and refund levels to past funding and refund levels.

When discussing what conditions would warrant a switch to a non-refundable check-off, one interviewee said, “As long as we’re generating a reasonable amount of income, which we’ve done.... We work within our means.”⁵³

When discussing why commissions, in general, have not switched to non-refundable check-offs another interviewee said,

I’m not sure that anyone has really sort of felt the real urge to change to a non-refundable because, generally speaking, refunds haven’t been – I don’t think any of them have ever approached 10%. If they did get to 10 or even as high as 25 then it would become a large red flag and somebody would have to address that. Either change the way they’re spending money so that the people asking for refunds are more satisfied, or do a better job of advertising how this money is spent and convince the people that are asking for refunds that that’s not a good idea, or to try to change to a nonrefundable one.⁵⁴

The expectations of those involved in check-off programs (farmers, directors, regulators, and politicians) regarding the effectiveness and sustainability of refundable check-offs programs have changed over time. Now that refundable check-off programs are common, the uncertainty

⁵³ Transcript 8.

⁵⁴ Transcript 17.

surrounding the effectiveness and sustainability of the refundable check-off model has reduced. The refundable check-off now dominates and is reputed as a check-off model that producers accept and that generates some money for research. Established commissions have come to expect certain levels of funding and refunds. The perception is that as long as actual performance of these check-off programs is consistent with expected performance, there is no reason to change it. In other words, “if it ain’t broke, don’t fix it.” Since check-offs are not perceived to be broken, no one attempts to fix them.

5.6.3 Proposition 4: Summary and Conclusions

This analysis suggests adaptive expectations contribute to check-off lock-in. The interviews revealed that some Commissions have not considered or evaluated the prospects of switching to non-refundable check-offs to any real extent. This decision was often based on the belief that switching is neither practical nor necessary. Increased prevalence of refundable check-offs lead to a belief that support for a non-refundable does not exist or cannot be generated cost effectively. Each of the last eight crop development agencies established was established as a commission and no commission has ever converted to a board. Some consider this evidence that going the non-refundable route is not a practical option. With this mindset, potential check-off groups are more likely to choose the commission style and existing commissions are less likely to devote resources to exploring the idea of switching to a non-refundable.

5.7 Summary and Conclusions

This analysis, which examines the sources of check-off lock-in, suggests large set-up costs, coordination effects, and adaptive expectations contribute to check-off lock-in while learning effects do not. The costs of setting up a refundable check-off program are large as a result of the difficult and complex procedures involved in establishing a commission. Switching from commission to board involves a significant reinvestment of resources. The economies of

scale that are a result of the high fixed costs of establishing a check-off, combined with the significant reinvestment that would be required to switch, mean that high set-up costs contribute to check-off lock-in.

Coordination effects also appear to be an important source of check-off lock-in. Conformity among check-off programs is beneficial as it lowers the cost of establishing and operating a check-off program. Now that most check-off are refundable, getting support for non-refundable check-offs is more difficult.

Adaptive expectations are a source of check-off lock-in. Commissions have not, for the most part, examined the option of switching to non-refundable levies. The increased prevalence of refundable check-offs has reduced the uncertainty regarding the effectiveness and sustainability of the refundable model. It has also reinforced the belief that generating the support required to switch is not cost effective.

Learning effects are not a significant source of check-off lock-in. Improved performance of commissions, and the check-off system in general, can be attributed to learning at check-offs' various institutional levels. However, the similarities between commissions and boards with respect to the way they are organized and designed make these learning effects transferable and not a contributing factor to check-off lock-in.

On their own, each of the three sources of check-off lock-in (large set-up costs, coordination effects, and adaptive expectations) bias the decision to either switch or stick with the status quo in favour of the latter. However, these sources do not work alone. They interact and complement one another and this interaction amplifies the costs of switching. For example, large set-up costs not only make it more difficult and costly for a commission to switch, they also

make it more difficult to convince other commissions to switch as well. This amplifies the adaptive expectation effect as the belief that switching is not cost effective is further reinforced.

CHAPTER 6: SUMMARY AND CONCLUSIONS

6.1 Introduction

Crop development commissions in Saskatchewan seem to suffer from lock-in. Low absolute levels of investment in research, together with empirical evidence from studies such as Gray and Scott (2003), Scott et al. (2005) and Gray et al. (2008), suggest producers spend too little on crop research. Theoretical and anecdotal evidence suggests the refundable nature of check-offs is part of the reason for this underinvestment. While switching to non-refundable levies is an option for these commissions, none have attempted to switch. Failure to address the free-rider problem by transferring to non-refundable check-offs suggests commissions are locked in to administering refundable check-offs. This thesis examined the sources of lock-in in the context of producer-controlled crop check-offs to determine if commissions are indeed locked in.

The theoretical framework used to examine the sources of check-off lock-in was based on Douglass North's theory of institutional change and Brian Arthur's theory of technological lock-in. Four propositions, based on Arthur's (1989) generic sources of technological lock-in but framed in the context of the research problem, were developed and tested. Data for the analysis were collected through external review of publically available information and interviews with individuals directly involved in crop research check-offs.

This thesis concludes in this chapter with a summary of the findings, policy implications, limitations of the study, and recommendations for further research.

6.2 Summary of Findings

The results of this study indicate that crop development commissions suffer from institutional lock-in that inhibits their ability to convert to development boards (a phenomenon referred to in this thesis as "check-off lock-in"). This conclusion was supported by the validation of three of the four propositions that relate to Arthur's sources of lock-in.

Large set-up costs associated with establishing a development commission support check-off lock-in. Interviewees indicated that the process for establishing a check-off agency is complex, onerous, and time consuming. Meeting the legal requirements set out by the Agri-Food Act for establishing a commission, which includes proving to the Agri-Food Council that adequate producer support for the proposed check-off exists, is difficult. If a commission were to attempt a switch from refundable to non-refundable, it would be required to go through a similar process all over again. Interviewees suggested the cost and the effort associated with switching from refundable to non-refundable are major barriers to switching.

Learning effects that occur throughout the establishment and operation of a refundable check-off system do not support check-off lock-in. While learning effects are present, they are also transferable to a non-refundable system. Therefore, learning effects do not seem to cause check-off lock-in.

Coordination effects contribute to check-off lock-in. Establishing a check-off requires a coordinated effort as many individuals, and groups of individuals, must work together. As more individuals and groups of individuals go along with or support the idea of a check-off, the cost of coordination per unit decreases; however, switching to an alternative check-off system becomes more difficult.

Evidence suggests adaptive expectations contribute to check-off lock-in. The adaptive expectations theory predicts individuals alter their behaviour and actions in ways that make their expectations come true. The expectations of those involved in the establishment and operation of check-off programs have likely been altered by their past experiences. The broad adoption and continued use of refundable-style check-offs may have created a belief that non-refundable

check-offs are not a practical option. As a result, decision makers are less likely to consider and support change.

6.3 Policy Implications

Since development commissions and development boards are so similar on the surface, the inability of commissions to switch to boards may seem unimportant from a policy perspective. However, the importance of check-off lock-in becomes clear when one considers the magnitude of the producer underinvestment problem, and the anecdotal and theoretical evidence that suggests that non-refundable check-offs are able to generate more funding than refundable check-offs.

Producers benefit significantly from their research investments, but continue to spend very little on research. Studies such as Gray and Scott (2003), Scott et al. (2005), and Gray et al. (2008) suggest producers receive between \$4.40 and \$20.20 for every dollar they invest in crop research. Despite these high rates of returns, producer check-off contributions typically amount to less than fifty cents per \$100 revenue received from the sale of the commodity. Since check-off agencies typically spend less than one third of check-off revenue on research, producer research investment generally amounts to less than \$0.16 per \$100 revenue received from the sale of the commodity.

Given the high rates of return and the low levels of investment it is not difficult to conclude that producers spend far too little on crop research from a profit maximizing perspective.

Table 6-1. Saskatchewan Crop Check-off Data

Commodity	Check-off Revenue ^a <i>dollars</i>	Research Expenditure ^a <i>dollars</i>	Check-off Rate ^b <i>percentage</i>	Agency Research Intensity ^c <i>percentage</i>
Pulse	9,474,821	4,189,702	1.00	44
Canola	2,965,617	941,200	0.21	32
Flax	568,853	57,246	0.32	10
Alfalfa Seed	124,809	58,272	0.78	47
Mustard	329,059	41,525	0.50	13
Forage Seed	48,688	5,642	0.75	12
Canaryseed	264,895	75,516	0.41	29
Oat	673,099	86,472	0.36	13
Winter Cereals	191,753	7,000	0.32	4

^a Figures represent three-year average ending in 2009 fiscal year unless otherwise stated.

^b Check-off rates as a percentage of the value of the commodity. For a description of the calculations, see Appendix A.

^c Research expenditures as a percentage of check-off revenue.

Source: Author's calculations. See Appendix A.

Converting refundable check-offs to non-refundable check-offs may be an important step to reducing the underinvestment problem. While there are a number of reasons why producers tend to underinvest in research, as discussed in Chapter 3, theoretical and anecdotal evidence suggests producers' ability to free-ride by requesting refunds is an important factor. The theoretical argument is that commissions' ability to increase check-off rates is limited because producers have the option to request a refund. Commissions must consider producer refunds when choosing a check-off rate. Boards, on the other hand, do not have this constraint when choosing a check-off rate and therefore may have more freedom to increase check-off rates and fund research at higher levels. Anecdotal evidence from the Saskatchewan Pulse Growers and the Australian GRDC check-off system supports this argument. Both administer compulsory levies and both collect funding and fund research at significantly higher levels than their refundable check-off equivalents.

As discussed in Chapter 3, lock-in may not be the only reason commissions have failed to switch to boards; however, this thesis suggests commissions are in fact locked in to administering refundable check-offs. This begs the question, how might commissions escape this lock-in?

According to Arthur (1988), escaping lock-in requires an exogenous shock or “injections of outside energy that ‘shake’ the system into new configurations so that it finds its way randomly into a lower cost one” (p. 16). The exogenous shock Arthur is referring to, can come from a number of sources. According to Cowan and Gunby (1996), a system can become unlocked by way of regulation, a crisis in existing technology, a technological breakthrough producing a (real or imagined) cost breakthrough, changes in taste, niche markets, or new scientific results.

While this thesis reveals that Commissions are locked in, it does not reveal to what degree they are locked in. In all likelihood, some are more locked in than others, which creates a dilemma for policy makers who now have two choices: do nothing and hope some sort of exogenous shock induces change, or intervene with policy in an attempt to induce change.

Perhaps the most direct approach would be for government to simply decree that all check-offs be non-refundable. The government could also make the process for switching simpler. Currently, commissions can change their check-off rate by altering an agency order, which, assuming producers support the idea, is a relatively simple and straightforward process compared to what would be involved in switching to a non-refundable check-off. Shapiro and Varian (1999) discuss the use of “sweeteners,” such as discounts on goods or services, to compel consumers to switch to a new brand. Perhaps the government could subsidize switching from commission to board.

Commissions could adopt regulations that require them to review their operating procedures on a regular basis. Perhaps votes could be held every few years on whether a given commission should continue charging refundable check-offs or switch to non-refundable check-offs.

Unless something is done to improve the performance of these check-off programs, farmers run the risk of losing their “voice” in the production and provision of crop research. As discussed in Chapter 2, producer-controlled check-off programs give farmers a voice in both the production and provision of crop research, which is beneficial to both farmers and society as a whole. If producer-controlled check-off agencies cannot find ways to fund research at significantly higher levels, the government may decide to take alternative action. The government could, for example, decide to expand the scope of intellectual property rights to induce additional investment from the private sector. Strengthening property rights can induce private research investment but it can also create other issues such as hold up problems (Gray et al. 2006).

6.4 Limitations of the Study & Recommendations for Further Research

The specific issue examined in this study is lock-in; however, the study relates to the broader issue of producer underinvestment in crop research. As discussed in Chapter 2, there are many possible reasons why producers continually underinvest in crop research from a profit-maximizing perspective. These include information issues, lack of research infrastructure, high rates of return to other activities, public investment crowding out producer investment, and regional research spillovers, etc. The refundable nature of check-offs, while potentially important, is only one possible source of the underinvestment problem. Moreover, lock-in is only one theory regarding why commissions seem to prefer the status quo. There are other theories, also discussed in Chapter 2, such as the endowment effect, cognitive dissonance, and

agency theory, which may help explain why commissions have not switched. By focusing the analysis solely on the issue of lock-in, this study does not account for the other potential sources of producer underinvestment and status quo bias.

Evidence gathered to examine the validity of Proposition 4 – adaptive expectations contribute to check-off lock-in – suggests agency theory could be applied to examine commissions’ apparent preference for the status quo. Responses from interviewees revealed a certain comfort level with current and very modest funding and research expenditure patterns. This may be an example of the principal-agent problem, which suggests commissions might want to review their current incentive structures. Further research could examine commissions’ status quo bias in the context of agency theory.

Further research could account for irrational behaviour by examining the problem through the endowment effect or cognitive dissonance theory lenses. In contrast to North’s and Arthur’s theories, which assume agents’ behaviour is economically rational, these theories assume agents’ biases for the status quo are irrationally based. It would be very interesting to develop experiments and test the presence of these effects in the context of producer-controlled crop check-offs.

While this particular study identifies the sources of check-off lock-in, it does not examine the degree to which commissions are locked in. Further research could examine or attempt to quantify the actual costs of switching from commission to board.

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APPENDIX A: Data Tables

Table A-1. Saskatchewan Crop Check-off Information

Development Agency	Date Established	Registered Producers	Check-off Status	Fiscal Year	
				Start	End
Saskatchewan Pulse Development Board	July, 1984	18,000	Non-refundable	September 1	August 31
Saskatchewan Canola Development Commission	February, 1991	26,000	Refundable	August 1	July 31
Saskatchewan Flax Development Commission	April, 1996	15,000	Refundable	August 1	July 31
Saskatchewan Alfalfa Seed Producers' Development Commission	July, 1997	350	Refundable	August 1	July 31
Saskatchewan Mustard Development Commission	October, 2003	2,300	Refundable	August 1	July 31
Saskatchewan Forage Seed Development Commission	June, 2005	NA	Refundable	July 1	June 30
Canaryseed Development Commission of Saskatchewan	February, 2006	5,000	Refundable	August 1	July 31
Saskatchewan Oat Development Commission	April, 2006	9,000	Refundable	August 1	July 31
Saskatchewan Winter Cereals Development Commission	August 2, 2006	2,800	Refundable	August 1	July 31

Source: Development Agencies' annual reports and websites, and the Agri-Food Council's website

Table A-2. Gross Check-off Revenue^a (dollars)

Commodity	Fiscal Year Ending									
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Pulse	2,408,818	2,748,418	2,478,225	3,075,810	4,369,329	5,184,037	4,852,436	6,578,792	9,773,330	12,072,342
Canola	1,487,415	1,820,226	918,325	859,733	1,360,248	1,716,254	3,050,920	2,840,965	3,008,787	3,737,712
Flax	579,178	498,875	502,202	448,962	540,661	376,137	633,235	725,407	557,827	505,103
Alfalfa Seed	90,731	111,140	216,407	169,508	169,019	51,215	89,143	201,033	104,527	100,651
Mustard					124,161	178,805	123,919	185,167	405,493	452,227
Forage Seed							40,950	57,035	58,215	39,093
Canaryseed							79,478	295,800	315,644	223,983
Oat								576,377	835,514	704,256
Winter Cereals								67,880	170,078	219,721

^a Check-off revenue before refunds.

Source: Development Agencies' annual reports

Table A-3. Refunds (dollars)

Commodity	Fiscal Year Ending									
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Canola	45,564	81,631	39,116	40,598	79,045	106,054	199,873	200,376	222,271	267,965
Flax	27,643	21,937	26,415	20,465	29,833	23,839	27,512	30,080	31,540	20,158
Alfalfa Seed	8,509	6,303	12,727	16,077	8,596	3,795	6,859	15,651	13,997	2,136
Mustard					2,837	5,441	2,729	8,893	23,846	22,972
Forage Seed							1,999	6,121	1,308	850
Canaryseed							3,865	13,863	14,995	11,884
Oat								21,312	32,422	43,116
Winter Cereals								182	3,798	2,495

Source: Development Agencies' annual reports

Table A-4. Net Check-off Revenue^a (dollars)

Commodity	Fiscal Year Ending									
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Pulse ^b	2,408,818	2,748,418	2,478,225	3,075,810	4,369,329	5,184,037	4,852,436	6,578,792	9,773,330	12,072,342
Canola	1,441,851	1,738,595	879,209	819,135	1,281,203	1,610,200	2,851,047	2,640,589	2,786,516	3,469,747
Flax	551,535	476,938	475,787	428,497	510,828	352,298	605,723	695,327	526,287	484,945
Alfalfa Seed	82,222	104,837	203,680	153,431	160,423	47,420	82,284	185,382	90,530	98,515
Mustard					121,324	173,364	121,190	176,274	381,647	429,255
Forage Seed							38,951	50,914	56,907	38,243
Canaryseed							75,613	281,937	300,649	212,099
Oat								555,065	803,092	661,140
Winter Cereals								67,698	166,280	217,226

^a Check-off revenue after refunds.

^b Since the pulse check-off is non-refundable, the figures for pulse in this table are the same as they are in Table A-2.

Source: Author's calculations based on Development Agencies' annual reports

Table A-5. Refund Rates^a (percentage)

Commodity	Fiscal Year Ending									
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Canola	3.1	4.5	4.3	4.7	5.8	6.2	6.6	7.1	7.4	7.2
Flax	4.8	4.4	5.3	4.6	5.5	6.3	4.3	4.1	5.7	4.0
Alfalfa Seed	9.4	5.7	5.9	9.5	5.1	7.4	7.7	7.8	13.4	2.1
Mustard					2.3	3.0	2.2	4.8	5.9	5.1
Forage Seed							4.9	10.7	2.2	2.2
Canaryseed							4.9	4.7	4.8	5.3
Oat								3.7	3.9	6.1
Winter Cereals								0.3	2.2	1.1

^a Dollars refunded as a percentage of gross check-off revenue. Calculated by dividing values in Table A-3 by values in Table A-2.

Source: Author's calculations based on Development Agencies' annual reports

Table A-6. Research Expenditures (dollars)

Commodity	Fiscal Year Ending									
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Pulse	1,394,499	1,259,636	1,015,682	1,572,497	2,252,010	3,113,474	3,373,358	3,306,210	4,021,320	5,241,575
Canola	494,745	389,738	419,781	174,525	349,515	440,356	637,313	707,797	1,046,499	1,069,303
Flax	267,594	271,747	195,625	183,619	100,725	589,07	37,774	91,677	25,389	54,673
Alfalfa Seed	30,281	66,781	78,047	104,326	129,245	77,180	83,395	49,217	34,266	91,333
Mustard						25,344	39,652	62,400	38,300	23,875
Forage Seed							0	11,260	5,665	0
Canaryseed								8,000	124,548	94,000
Oat								25,000	79,737	154,678
Winter Cereals								0	0	21,000

Source: Development Agencies' Annual Reports

Table A-7. Commodity Prices Adjusted for Inflation^a (2009 base year)

Commodity	Year									
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Canola	275.20	335.12	409.57	377.11	361.15	270.34	273.40	379.10	501.41	399.39
Flax	234.14	311.35	392.49	364.30	408.40	414.93	237.18	353.33	585.91	375.40
Alfalfa Seed ^b	0.83	0.64	0.92	0.88	0.92	0.95	1.01	1.07	1.22	1.21
Canaryseed	284.80	510.09	812.98	464.92	323.68	219.92	246.20	403.20	563.89	403.04
Oat	84.77	132.06	210.21	137.67	120.25	112.76	130.53	165.08	166.37	114.72
Winter Cereals	124.13	129.83	158.55	173.98	146.05	110.18	144.13	135.98	276.51	186.88

^a Price per tonne unless otherwise specified.^b Price per pound.

Source: Author's calculations based on data from Government of Saskatchewan website b, Government of Alberta website, Canadian Wheat Board website, and Statistics Canada n.d.

Table A-8. Check-off Revenue, Research Expenditure, and Commodity Price, and Current Check-off Rate

Commodity	Net Check-off Revenue ^a	Research Expenditure ^b	Commodity Price ^c	Current Check-off Rate
Pulse	9,474,821	4,189,702	-	1 % GVS
Canola	2,965,617	941,200	358.18	0.75 \$/tonne
Flax	568,853	57,246	367.74	1.18 \$/tonne
Alfalfa Seed	124,809	58,272	0.96	0.0075 \$/pound
Mustard	329,059	41,525	-	0.5 % GVS
Forage Seed	48,688	5,642	-	0.75 % GVS
Canaryseed	264,895	75,516	423.27	1.75 \$/tonne
Oat	673,099	86,472	137.44	0.5 \$/tonne
Winter Cereals	191,753	7,000	158.62	0.5 \$/tonne

^a Average annual check-off revenue from fiscal 2007 to fiscal 2009.

^b Average annual research expenditure from fiscal 2007 to fiscal 2009.

^c Ten year average real price. Expressed as dollars per tonne for canola, flax, canaryseed, oats, and winter cereals. Expressed as dollars per pound for alfalfa seed.

Source: Author's calculations based on Agencies' annual reports

Table A-9. Check-off Rates and Research Intensities

Commodity	Check-off Rate ^a (percentage)	Agency Research Intensity ² (percentage)	Producer Research Intensity ³ (percentage)
Pulse	1	44	0.44
Canola	0.21	32	0.07
Flax	0.32	10	0.03
Alfalfa Seed	0.78	47	0.37
Mustard	0.5	13	0.06
Forage Seed	0.75	12	0.09
Canaryseed	0.41	29	0.12
Oat	0.36	13	0.05
Winter Cereals	0.32	4	0.01

^a Check-off as a percentage of the value of the commodity. Rates for check-offs based on production (i.e, canola, flax, alfalfa seed, canaryseed, oats and winter cereals) were calculated by dividing the current check rates in Table A-8 by the commodity prices in Table A-8.

^b Agencies' research expenditure as a percentage of net check-off revenue. Agency research intensities were calculated by dividing research expenditure values in Table A-8 by the net check-off revenue values in Table A-8.

^c Producers' research expenditures as a percentage of the value of the commodity.

Source: Author's calculations based on data from the sources noted in tables above

APPENDIX B: Producers' Check-off Preferences

Background

Evidence suggests producers collectively spend too little on crop research from a profit-maximizing perspective. Producers invest in crop research through check-offs. One way to potentially increase producer investment in crop research is to alter existing check-off mechanisms. Since producers would be included in a decision to alter check-offs, their preferences regarding specific check-off features are important.

Purpose

The purpose of this experiment is to examine whether information regarding the rates of return to research investment, research-funding levels in other countries, and alternative funding systems would affect producers' check-off preferences.

Methodology

The subject of this analysis was a Farmer Marketing Club in rural Saskatchewan. This relatively informed group agreed to participate in the experiment in return for a market outlook presentation from Professor Gray.

The experiment was set-up as follows. Participants were asked to fill out a survey. After the survey was complete, Professor Gray gave a PowerPoint presentation that included information on the documented rates of return to investment agricultural research, research-funding levels in other countries, and alternative research funding systems. After the presentation, participants were asked to fill out a second survey that was identical to the first to see if their answers changed.

The paper survey used a multiple-choice format. Participants were asked to indicate their check-off preferences with respect to refundable versus non-refundable check-offs as well as check-off rates for various commodities. Participants were asked to identify their preferred check-off rate for crops that they have grown recently. The crops included in the survey were wheat, canola, pulses, barley, winter cereals, and canaryseed.

For each crop, participants were to choose one of five rates for only the crops they have grown in the past five years. The five choices included the current check-off rate charged to that particular commodity and four alternatives. The current rate or 'status quo' choice was always option 3 and it was revealed that it was in fact the actual check-off that they currently pay. We provided this information to give the participants a frame of reference when making their decision. The values of the alternative check-off rates were calculated based on the following formulas:

value for option 1 = 0% (x) where x = current check-off rate

value for option 2 = 50% (x)

value for option 3 = 100% (x)

value for option 4 = 150% (x)

value for option 5 = 200% (x)

All check-off values except for the pulse check-off values were presented in dollars per tonne. The pulse check-off values were presented as a percentage of the gross value of the sale which is consistent with the actual pulse check-off.

Results

In the first round of surveying, eight respondents indicated they preferred refundable check-offs and one respondent indicated a preference for non-refundable check-offs. In the second round of surveying, five respondents indicated that they preferred refundable check-offs while four respondents indicated that they preferred non-refundable check-offs (see Figure B-1).

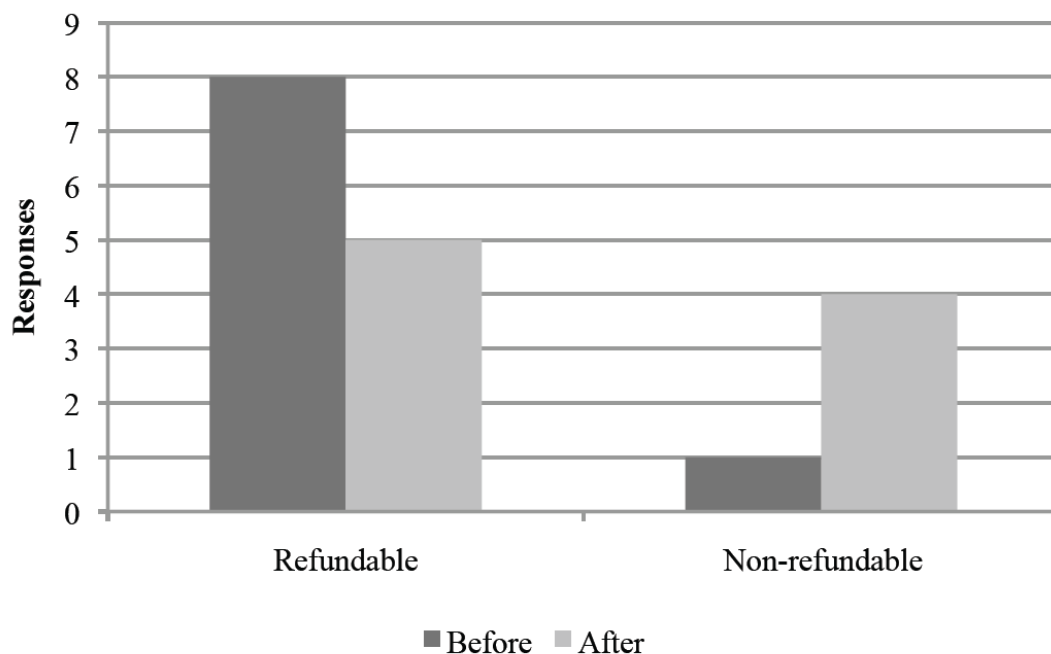


Figure B-1: Preferences: Refundable versus Non-refundable

In the first round of the survey there were:

- eleven instances where participants indicated that they preferred a check-off rate equal to zero;
- eleven instances where participants indicated that they preferred a check-off rate equal to half the current check-off rate;
- eighteen instances where participants indicated that they preferred a check-off rate equal to the current check-off rates; and

- two instances where participants indicated that they preferred a check-off rate 50 per cent higher than the current check-off rate.

On average, in the first round of the survey participants indicated that they preferred a check-off rate equal to 62 per cent of current rates.

In the second round of the survey there were:

- eight instances where participants indicated that they preferred a check-off rate equal to zero;
- seven instances where participants indicated that they preferred a check-off rate equal to half the current check-off rate;
- fifteen instances where participants indicated that they preferred a check-off rate equal to the current check-off rates;
- eight instances where participants indicated that they preferred a check-off rate 50 per cent higher than the current check-off rate; and
- four instances where participants indicated that they preferred a check-off rate 100 per cent higher than the current check-off rate.

On average, in the second round of the survey participants indicated that they preferred a check-off rate equal to 92 per cent of current rates (see Figure B-2).

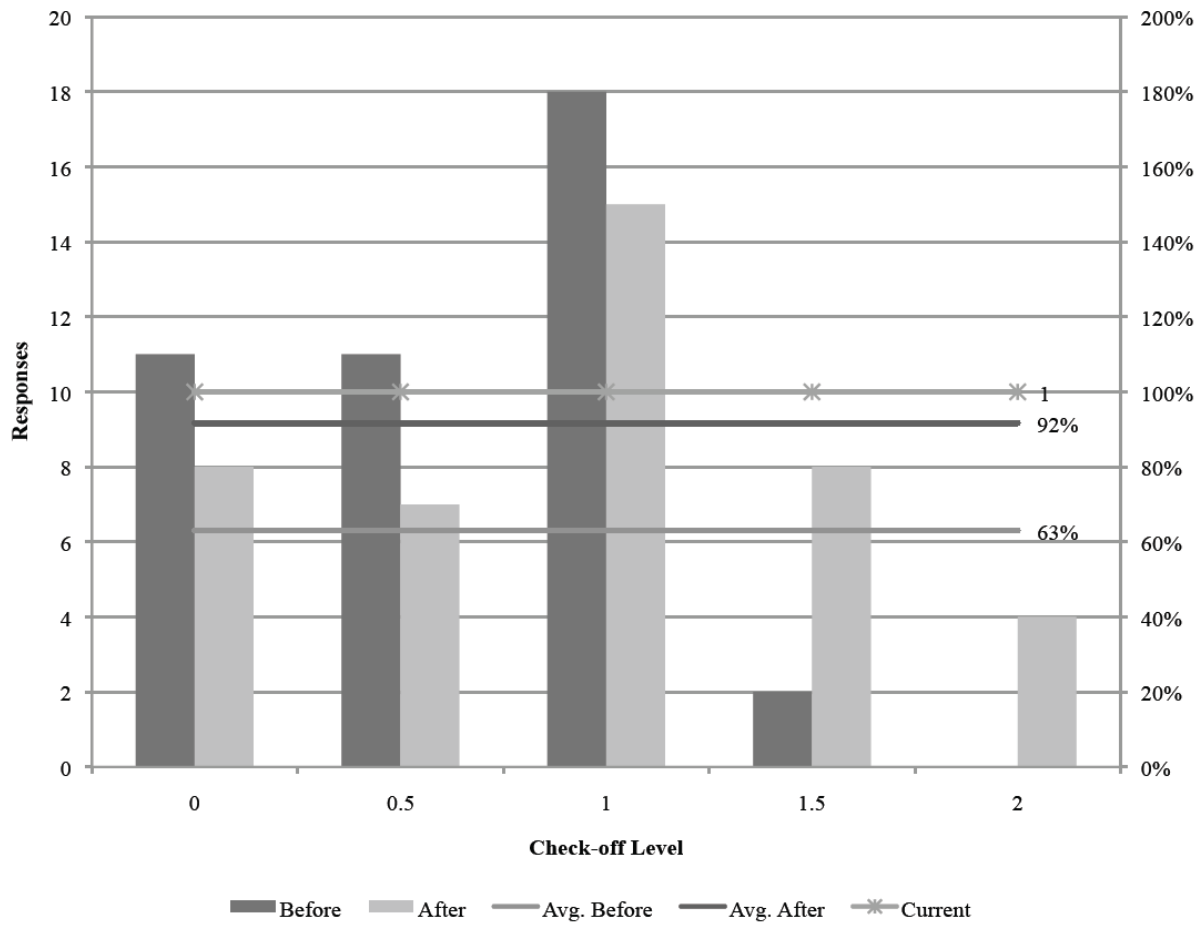


Figure B-2: Preferences: Check-off Rates

APPENDIX C: Producers' Check-off Preferences Questionnaire

We would like to know – what is your ideal check-off? Most crops grown in Saskatchewan have a development agency that collects a check-off on behalf of their growers. The check-off money collected is used to fund various activities such as market development, extension services, and cost of production reducing research.

Not all check-offs are the same. Often, check-off rates vary between agencies with some charging relatively high rates and some charging relatively low rates. Some agencies have their check-off revenue matched \$1 to \$1 by the government while others do not. Some agencies charge a levy that can be refunded to the producer upon written request while others are non-refundable. We would like to know which features you prefer as well as your opinions on research check-offs in general.

Section 1:

Please put a check in the box that that best describes you and your operation.

1) Are you a certified seed grower?

☐ Yes

☐ No

2) Please indicate which of these age groups you fit in.

☐ 18-29

☐ 30-39

☐ 40-49

☐ 50-59

☐ 60-69

☐ over 70

3) What is the highest level of education you have obtained?

☐ grade school

☐ some high school

☐ completed high school

☐ post secondary training

☐ university degree/diploma

4) How many acres do you farm?

☐ 160-1280

☐ 1281-2560

☐ 2561-3840

☐ 3841-5120

☐ 5120 -10,000

☐ 10,000 +

5) Will a family member continue to farm your land when you are no longer farming?

☐ Yes

☐ No

☐ unsure

Section 2:

1) Do you support crop research check-offs?

☐ Yes

☐ No

If yes please explain why?

If no please explain why not?

2) Do you prefer a checkoff that is matched or unmatched by the government?

☐ Matched

☐ Unmatched

3) Do you prefer a checkoff that is refundable or nonrefundable? An example of a refundable checkoff is the WGRF checkoff on wheat and barley. An example of nonrefundable checkoff is the Saskatchewan Pulse Growers checkoff.

☐ Refundable

☐ Nonrefundable

4) Please check the level of check-off that you would prefer but only answer for crops that you have grown within the past five years.

Wheat (including Durum)-measured in \$/metric tonne

☐ \$0/tonne

☐ \$0.15/tonne

☐ \$0.30/tonne (current Wheat checkoff)

☐ \$0.45/tonne

☐ \$0.60/tonne

Canola-measured in \$/metric tonne

- ☐ \$0/tonne
- ☐ \$0.375/tonne
- ☐ \$0.75/tonne (current Canola checkoff)
- ☐ \$1.125/tonne
- ☐ \$1.50/tonne

Pulse-measures as a percentage of the gross value of sale

- ☐ 0%
- ☐ 0.5%
- ☐ 1% (current pulse checkoff)
- ☐ 1.5%
- ☐ 2%

Barley-measured in \$/metric tonne

- ☐ \$0/tonne
- ☐ \$0.25/tonne
- ☐ \$0.50/tonne (current Barley checkoff)
- ☐ \$0.75/tonne
- ☐ \$1.00/tonne

Winter Cereals-measured in \$/metric tonne

- ☐ \$0/tonne
- ☐ \$0.25/tonne
- ☐ \$0.50/tonne (current Winter Cereal checkoff)
- ☐ \$0.75/tonne
- ☐ \$1.00/tonne

Canaryseed-measured in \$/metric tonne

- ☐ \$0/tonne
- ☐ \$0.875/tonne
- ☐ \$1.75/tonne (current Winter Cereal checkoff)
- ☐ \$2.625/tonne
- ☐ \$3.50/tonne

Stop

APPENDIX D: Interview Consent Form

Researcher: Eric Froystad

Phone: 306.966.4025

Purpose and Procedure: I would like to receive your responses to questions about your agency's check-off mechanism. The research will examine the factors that affect farmer investment in crop research. Your participation in this study is appreciated and completely voluntary. It is expected that the interview should last between 45 and 60 minutes, although some follow up may be required. You may withdraw at any time without penalty during this process should you feel uncomfortable or at risk. All interviews will be audio taped and you have the right to shut off the tape recorder at any time. You should also feel free to decline to answer any particular question(s). Should you choose to withdraw from the study, no data pertaining to your participation will be retained.

Potential Risks: The study team will make every effort to preserve the confidentiality of your comments (see below), but you should be aware that controversial remarks, in the unlikely event they are associated with you, could have negative consequences for your relationships within your industry. We will try to ensure that your identity is protected in the ways described below. If for some reason the researchers wish to quote you in some way that might reveal your identity, they will seek your permission beforehand.

Potential Benefits: Participation will provide useful information that may improve agencies' ability to generate additional funding for agricultural research. Funding agricultural research has proved to be beneficial to farmers and society as a whole.

Storage of Data: Transcripts and original audio recording of the interview will be securely stored by the Supervisor (Dr. Gray) at the Department Bioresource Policy, Business and Economics for a period of five years. The data will be destroyed, after at least 5 years, when it is no longer required.

Confidentiality: Mr. Eric Froystad will transcribe your interview at your request. After your interview, and prior to any data being included in a final report, you will be given the opportunity to review the transcript of your interview, and to add, alter, or delete information from the transcripts as you see fit.

The research conclusions will be published in a variety of formats, both print and electronic. These materials may be further used for purposes of conference presentations, or publication in academic journals, books, or popular press. In these publications, the data will be reported in a manner that protects confidentiality and the anonymity of participants. Participants will be identified without names being used, giving minimal information if this information is relevant. Pseudonyms or composite profiles may be used to disguise identity further, if necessary. Any communication of these results that has clear potential to compromise your public anonymity will not proceed without your approval.

Right to Withdraw: You may withdraw from the study for any reason, at any time, without penalty of any sort. If you choose to withdraw from the study, any information that you have contributed will be deleted. You will be informed of any major changes that occur in the circumstances of this study or in the purpose and design of the research that may have a bearing on your decision to remain as a participant.

Questions: If you have any questions concerning the study, please feel free to contact the Researchers at the number provided above.

This study was approved on ethical grounds by the University of Saskatchewan Behavioural Sciences Research Ethics Board on May 27th/09. Any questions regarding your rights as a participant may be addressed to that committee through the Office of Research Services (966-2084).

Consent to Participate: I have read and understood the description provided above; I have been provided with an opportunity to ask questions and my questions have been answered satisfactorily. I consent to participate in the study described above, understanding that I may withdraw this consent at any time. A copy of this consent form has been given to me for my records.

(Signature of Participant)

(Date)

(Signature of Researcher)

(Date)